


Coal Age



GRASSROOTS OPINION...p 62



Repairs don't mean shut-downs with MINE CARS

It's hard to imagine a whole mine car system being 'out for repair' at one time. A mine fully equipped with mine cars doesn't face that situation. *That's the advantage of using a 'Constant Haulage' system which is possible only with mine cars.*

Sure, there are occasional delays when you haul coal with mine cars. But only one easily repaired unit is delayed...only a few tons of coal are held up. The rest of the cars keep moving, and so do your cutters, loaders and processing machinery. A well-planned mine car system insures you against long, costly delays in production!

Let your A.C.F. Sales Representative explain what a dependable mine car system can mean to you. American Car and Foundry Company, New York • Chicago • St. Louis • Cleveland • Washington • Philadelphia • San Francisco • Pittsburgh • Huntington, W. Va. • Berwick, Pa.

A.C.F. MINE CARS
for Constant Haulage

Research keeps
B.F. Goodrich
FIRST IN RUBBER



B. F. Goodrich cord conveyor belt

*Gives 2 to 6 times greater impact resistance,
troughs better, lasts longer*

IN the cord plies of a B.F. Goodrich belt each cord is completely surrounded by rubber—no cross threads tie them together. These parallel cords are completely insulated from one another by rubber, free to “give” lengthwise and crosswise when an impact occurs. Thus the rubber can distort temporarily to distribute and absorb shocks that would damage a stiff, unyielding carcass. This augmented impact cushion means better belt service, longer belt life.

Cord belts trough better—Cord belts carry the load with less belt damage, less material “spill.” Even

thick, narrow cord belts trough naturally. And because they trough better, cord belts keep centered on the idlers, sustain less damage, require less maintenance. Longer centers, higher lifts can be used. Creasing action between idlers (as in a fabric-type belt) is eliminated.

Cord belts last longer, reduce costs—The better impact cushion of cord construction resists cuts and gouges. A transverse cord “breaker” floated above and across the main cord section helps cushion impact, keeps the cover from stretching beyond elastic limits, and provides better adhesion between cover

and carcass. With each cord completely sealed in rubber, this BFG belt resists the effects of acid materials, moisture, mildew.

Cord belts for tough jobs—If your belts must take severe impact on loading or “over the idlers,” cutting and gouging at the loading chute, exposure to moisture and acid materials, heavy loads with long centers and high lifts, you need BFG cord belts. Your local distributor will show you how they can save you money. *The B.F. Goodrich Company, Industrial Products Division, Akron, Ohio.*

B.F. Goodrich
RUBBER FOR INDUSTRY

The Champion

...PIONEER OF AMERICAN OARSMEN



Drawing from
oil and pencil

In 1868, the village of Aurora, in Cayuga County, N.Y., laughed so hard at the crude home-made craft of a youth of nineteen, who wanted to compete in the single sculls event, that he nearly withdrew from the race. But fortunately, laughter acted as a spur to Charlie Courtney. Enraged, he entered the race, and won with ease! So began the career of the finest oarsman America ever produced. During the next few years, as an amateur, Courtney entered 88 races without a single defeat. Turning professional, he lost only 7 races out of 39. During his long reign as Coach at Cornell, "victory became a Cornell habit"—the great crew of 1901 setting the mark of 18 min. 53-1/5 sec. for a 4 mile course on the Hudson. Though the "Courtney Stroke" became famous, Courtney always insisted he did not adhere to any set formula in training his almost unbeatable crews.

HULBURT OIL & GREASE COMPANY, PHILADELPHIA, PA.

Specialists in Coal Mine Lubrication

The Champion

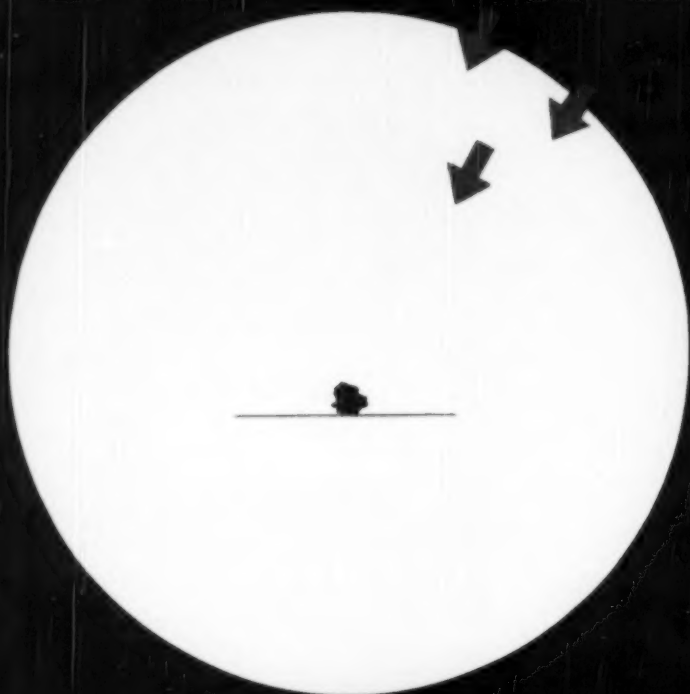
...IN COAL MINE LUBRICATION



Hulbert Quality "The Champion" GREASE

You can't laugh off the results so many mines have had making their mining machinery run better—at less cost—with Hulbert Quality Grease. In your constant race against depreciation and obsolescence, with PRODUCTION as your goal, you'll win a victory over lubrication troubles every time with Hulbert Grease. That's because the Quality of this great Grease is famous—and WE do attain that Quality by insisting on a set formula in compounding it—and you get the benefit of Hulbert Quality in setting new marks for lower operating and maintenance costs of coal mining machinery.

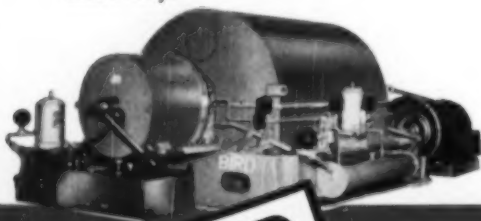
A LOT OF IT'S THIS SIZE AND SMALLER



How Do You Dry It?

You can't afford, nowadays, to throw it away — and it's got to be washed to sell.

The big job is getting it dry. But, now, that's easy.



The BIRD

Continuous Centrifugal COAL FILTER

The BIRD COAL FILTER delivers up to a ton of $\frac{1}{4}$ " x 0 a minute, 90 to 92% dry, even when the feed contains 10% minus 200 mesh fines.

With the BIRD you can operate a closed water system. It runs continuously for months without overhaul.

Why not get the whole story.

WRITE
BIRD MACHINE COMPANY, South Walpole, Mass.



THIS MONTH'S COVER

THE COLMOL in action underground. If you are interested in what continuous mining and other new machinery "now in the works" can do for you, make sure you see *Coal Age* next month.

COMING IN JULY



YOU'LL FIND the "New Mining Horizons" number a practical guide to cutting costs, boosting output and improving quality you can use every day as . . .

1. A thorough analysis and explanation of today's methods and machines that are getting high efficiencies at many mines.

2. A searching examination of the new machines and methods either now being developed or anticipated shortly that will mean much to the industry and you.

No matter what your job is — if you're after results in mining — you'll want to read July *Coal Age*.

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KEEP MACHINES WORKING

Prevent stoppages by keeping rust, sludge and foam out of hydraulic mechanisms with TEXACO REGAL OILS (R&O)

Wherever hydraulics are used . . . on loaders, cutters, shovels, trucks and other equipment . . . operation is smoother and costly stoppages are eliminated when you charge systems with *Texaco Regal Oils (R & O)*. These are turbine-grade oils with special, "built-in" resistance to rust, sludge and foam.

Texaco Regal Oils (R & O) keep hydraulic systems clean, free of the rust and sludge that, with ordinary oils, clog orifices and damage pumps. Thus, fewer cleanings and overhauls are necessary . . . maintenance costs are less . . . pumps last longer. And *Texaco Regal Oils (R & O)* need no "cutting back." There are suitable viscosities for every hydraulic unit, and every operating condition.

To keep trains rolling, lubricate mine car wheels with *Texaco Olympian Grease*. It assures easier starts, smoother operation, longer bearing life — and reduces maintenance costs.

Reduce costs and improve machinery performance throughout your mine with Texaco Lubricants. A Texaco Lubrication Engineer will gladly assist you. Just call the nearest of the more than 2,000 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TUNE IN . . .
TEXACO STAR THEATER
starring MILTON BERLE
on television
every Tuesday night.
See newspaper for
time and station.

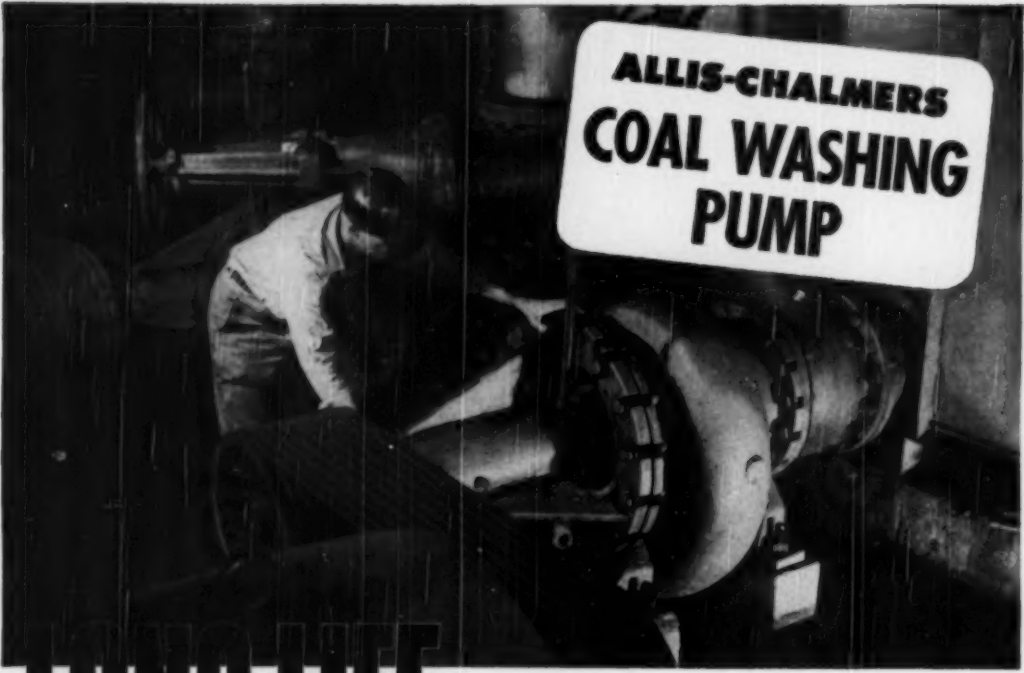


TEXACO LUBRICANTS





For the Coal Mining Industry



ALLIS-CHALMERS COAL WASHING PUMP

LONG LIFE

plus easy servicing

GIVE YOU LOWER PUMPING COSTS

USERS HAVE REPORTED as much as four times longer life with Allis-Chalmers coal washing pumps because they are made of special hard *Allisite* alloy . . . because they have thicker sections and heavier parts throughout . . . and because they are application engineered by specialists who know coal washing problems and how to solve them.

Replace Worn Parts In Half Hour

When parts must be replaced, as they must in all coal washing pumps, you will save many hours of time and many dollars of expense with the Allis-Chalmers coal washing pump. This pump is designed with only five wearing parts, all made for easy handling and replacement. The pump can be torn down, an element replaced and the pump reassembled in less than a half hour. Piping need not be disturbed unless casing must be replaced.

Three sets of bearings, brackets and shafts cover all pump sizes making spare parts inventory low regardless of the number of pumps you operate. Head and capacity can be changed instantly when the drive is equipped with the new *Vari-Pitch* Automatic sheave and *Texrope* V-belt drive.

ALLIS-CHALMERS, 968A SO. 70 ST.
MILWAUKEE, WIS.

ALLIS-CHALMERS

Get The Facts Now

Discuss your coal washing equipment problems with an Allis-Chalmers pump engineer. He can show you dollars and cents savings you can make. Contact your A-C Sales Office today. Or write for Bulletin 08B6381.

A-2991


Vari-Pitch, *Texrope* and *Allisite* are Allis-Chalmers trademarks.



ONLY FIVE WEARING PARTS

Shaft sleeve, impeller, casing, two wear plates. All easy to handle and easy to replace.





Tirex Cables Can Take It!!

NAME YOUR HAZARDS; the hazards that time and again raise havoc with the portable cords and cables you depend upon for the efficient operation of vital electric equipment.

Water, snow and mud as pictured here; dragging over rough surfaces and pulling around sharp bends; runovers by heavy mobile equipment; grease, oil, chemicals, sunlight, heat and flame—a few, perhaps all of these cable enemies are writing "down time" into the performance records of your equipment.

You can beat the problem, simply, economically, by specifying Simplex-TIREX Cords and Cables when you next order. The TIREX line is performance proved—proved in the field under the most severe conditions during more than a quarter-century of service to all industries. It includes cords and cables that meet the requirements of all portable electric apparatus. All are jacketed with cured-in-lead Selenium Neoprene Armor, the toughest, most-reliable protection available for portable cords and cables.

If you would like complete information write us today for a TIREX Catalog, specifying the voltage range you are principally interested in.

SIMPLEX WIRE & CABLE CO., 79 SIDNEY ST. CAMBRIDGE 39, MASS.

PURCHASING DEPARTMENT
MEMO

C.D.R.

Re your note track bolts
and spikes, Bethlehem has
complete size range and offers
immediate delivery. I placed
order with them today.

F.L.W.

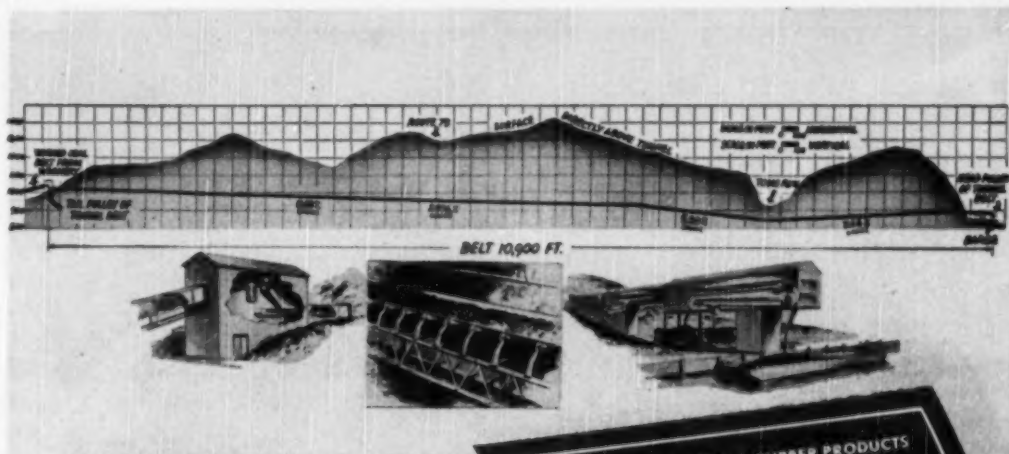


BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by
Bethlehem Pacific Coast Steel Corporation
Export Corporation: Bethlehem Steel Export Corporation

OTHER BETHLEHEM FASTENINGS FOR THE MINE

RIVETS • U-BOLTS • THREADED RODS • ROOF BOLTS AND ACCESSORIES • STANDARD BOLTS AND NUTS



WORLD'S LONGEST single-flight conveyor is shown in artist's schematic drawing. Inset spots show head end of belt and slope belt from mine; same inside tunnel and delivery end of belt feeding cars and barges.

World's longest single-flight conveyor

"Two-Miler" Manufactured by Goodyear
Carries Coal through a Mountain to Market

GOODYEAR INDUSTRIAL RUBBER PRODUCTS

G.I.R.-Specified

COMPASS STEEL CABLE CONVEYOR
FOR STEEL COMPANY COAL MINE

Heavy-duty, abrasion-resistant rubber cover

Single plane of steel-cable load carriers. All cables flex around pulleys on same radius, and are protected from external abuse by thick sheath of rubber.

Two-ply fabric envelope

High quality fabric breaker

FOR HOSE, FLAT BELTS, V-BELTS, MOLDED GOODS, PACKING, TANK LINING built to the world's highest standard of quality phone your nearest Goodyear Industrial Rubber Products Distributor.

A WEST VIRGINIA mine was cut off from low-cost barge transportation on the Monongahela River by a mountain barrier two miles wide. Rail, highway and aerial tram transportation all figured at too high cost per ton. Then the G.T.M.—Goodyear Technical Man—demonstrated the feasibility of a single belt through the mountain, to carry the coal by conveyor belt. So a tunnel was driven through, and a belt installed.

It's the world's largest single-flight conveyor belt—22,000' of Goodyear's COMPASS Steel Cable Belt, 30" wide, operating on 10,900' centers. "Sinewed" with airplane-type steel cables in the load-carrying section,

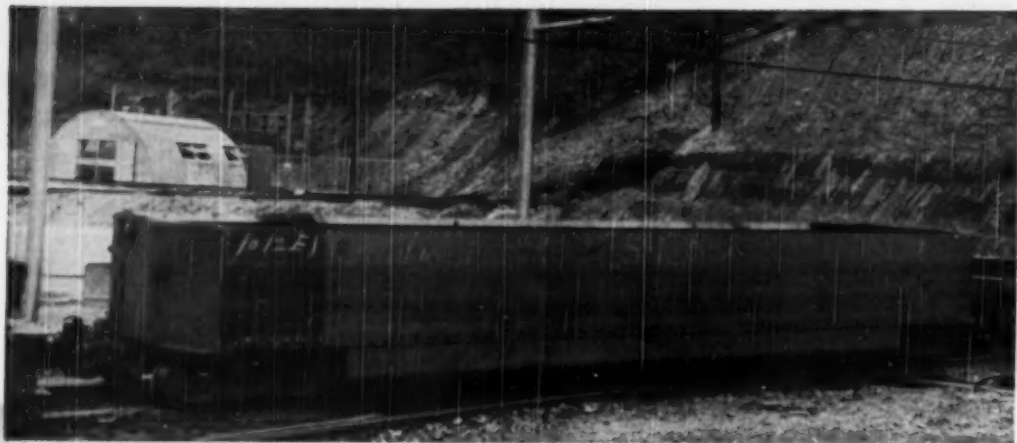
the COMPASS belt is the only type of belt capable of handling this long run. Now in operation, it is delivering a steady 300 T.P.H. to the barges.

This same exclusive Goodyear principle enables the G.T.M. to design belts for hitherto impossible operations, including slope lifts up to 1500' in a single flight. Ask him for the full story on the records set by COMPASS belts. You can get in touch with the G.T.M. through your nearest Goodyear Industrial Rubber Products Distributor, or by writing Goodyear, Akron 16, Ohio.

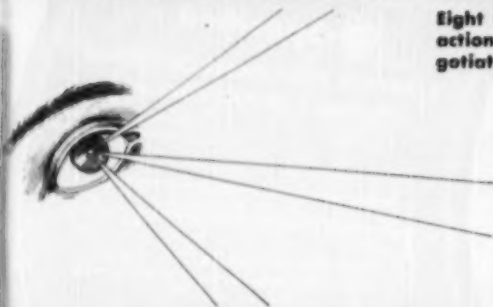
GOOD YEAR

THE GREATEST NAME IN RUBBER

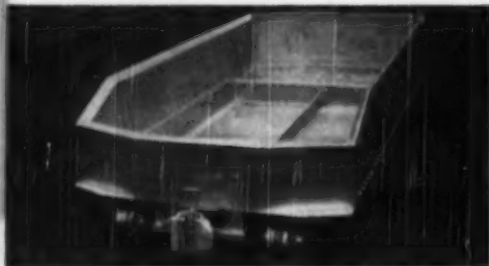
COMPASS—T.M. The Goodyear Tire & Rubber Company, Akron, Ohio



Eight wheel AXLESS Trucks with long gentle spring action produce the utmost in roadability and negotiate uneven tracks easily.



Differential cars yield maximum capacity within given dimensions. Sturdily constructed for long life, low maintenance.



A smooth, clean interior. Minimizes coal sticking in the car.

**NO MATTER
WHICH WAY YOU LOOK AT IT**

DIFFERENTIAL MINE CARS

**ADD UP TO "TOPS" IN
DESIGN, WORKMANSHIP, AND PERFORMANCE**

DIFFERENTIAL STEEL CAR COMPANY

FINDLAY, OHIO, U. S. A.

Builders of Haulage Equipment Since 1915

AIR DUMP CARS

MINE CARS

MINE LOCOMOTIVES

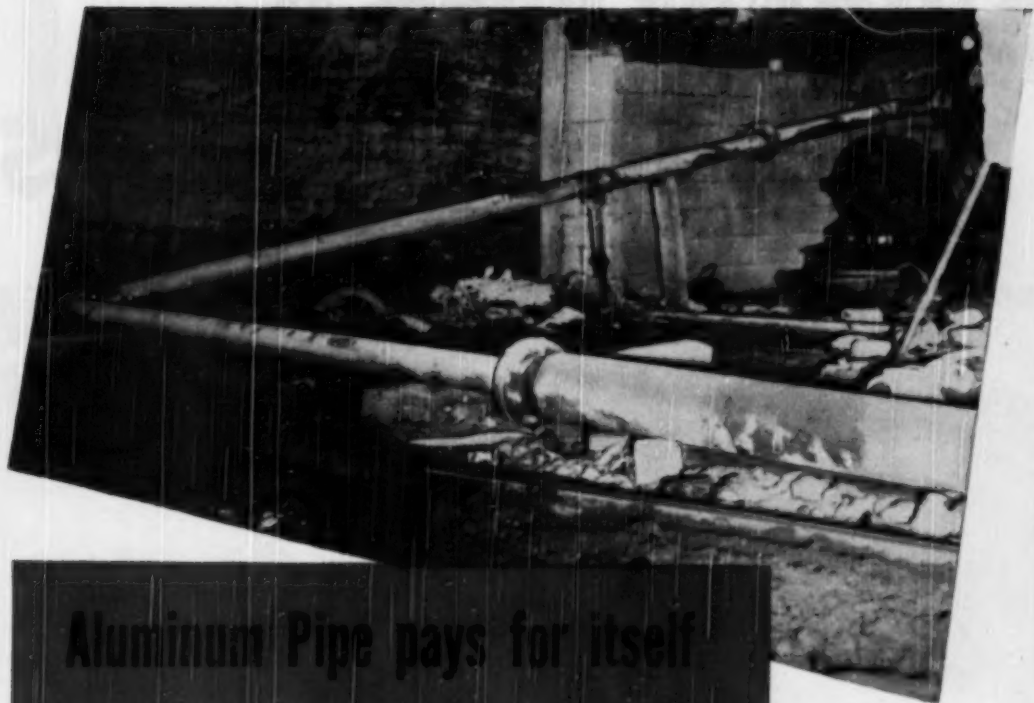
ROCK LARRIES

DUMPING DEVICES

BURDEN-BEARING LOCOMOTIVES

STOCKPILING CARS

COMPLETE HAULAGE SYSTEMS



Aluminum Pipe pays for itself

Twice in 5 months

Knowing this typical Pennsylvania coal mine's experience with Alcoa Aluminum Pipe may save you important money. In a drainage line where ordinary metal pipe had had an average life of one month, the Alcoa Pipe was still going strong after *five* months. Although somewhat higher than ordinary pipe in first cost, it had paid for itself twice during that period.

You, too, can save with Alcoa Aluminum Pipe because:

1. It resists corrosion by sulfurous mine waters, outlasting rustable metal from two to ten times.
2. Installation is faster because Alcoa Pipe weighs only a third as much as heavy metal pipe. In low seams, it may actually cost less in place. You save in relining, too.
3. Alcoa Pipe doesn't get brittle or crush easily under rock falls.
4. Joining is easy, using familiar standard methods and fittings.

Get the full story on Alcoa Aluminum Pipe. Call your local Alcoa representative, or send coupon for free booklet.

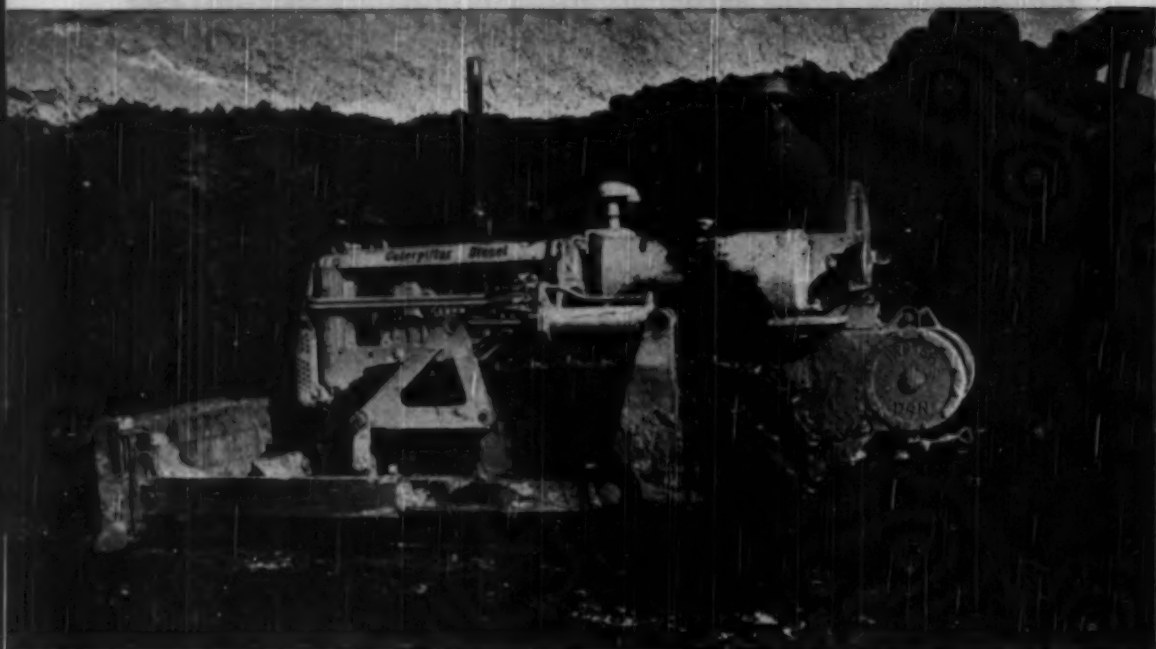


ALUMINUM COMPANY OF AMERICA
1979F Gulf Building, Pittsburgh 19, Pa.
Gentlemen: Please send copy of your booklet, "Alcoa Aluminum Pipe", to

Name _____
Company _____
Title _____
Company Address _____
City _____ State _____

INGOT • SHEET & PLATE • SHAPED ROLLED & EXTRUDED • WIRE • ROD • BAR • TUBING • PIPE • SAND DIE & PERMANENT MOLD CASTINGS • FORGINGS • IMPACT EXTRUSIONS
ELECTRICAL CONDUCTORS • SCREW MACHINE PRODUCTS • FABRICATED PRODUCTS • FASTENERS • POW • ALUMINUM PIGMENTS • MAGNESIUM PRODUCTS

Slugger with a bagful of punches



"It's used for everything," says Charles Lamb, speaking for Eastern Collieries, Ltd. (Saskatchewan), regarding the versatile power-house-on-tracks you see pictured above. That's typical. "Caterpillar" Diesel Tractors are built for many uses and to operate various items of matched equipment. Give one a pair of "fighting mitts," like a "Caterpillar" Bulldozer and a Hyster winch, and it can really deliver a variety of telling work punches — move rocks, topple trees, pull stumps, remove overburden, level spoil, clean up around shovel, clear away snow, build haul roads, tow trucks, to name a few.

An equally big pay-off comes from its **STAMINA, DEPENDABILITY** and **LONG LIFE**. Consider those things when making comparisons.



Latest reports are that the hard-working unit shown here has required no repairs whatever since the day it was purchased, in 1948.

They hold the key to tractor superiority. Like the prize fighter who can stay on his feet round after round, the tractor which day after day can both "take it and hand it out" is the one that's the real profit maker. "Caterpillar" Diesel Tractors are like that. ★ They don't need "long counts" (down time) to stay in there and slug it out. "Caterpillar" leaves nothing undone toward building 60-second minutes, 60-minute hours, 24-hour days of *fighting performance* into every unit that bears its name. Ask your "Caterpillar" dealer to prove it with facts and demonstrations. He can do it!

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

LOOK UNDER THE HIDE for the qualities that pay off in tractor performance and long life... you'll find them in every "Caterpillar" detail. For example:



Hard Chrome-Faced Compression Rings are standard on all models of "Caterpillar" Diesel Tractor Engines—increasing life and performance at critical point of engine design.



Alloy Iron Wet Type Cylinder Liners are "Hi-Electro" hardened—giving exceptionally long life. Wearing surface is chemically treated for proper break-in.



Solid Aluminum Alloy Connecting Rod and Main Bearings are exclusively "Caterpillar." Advantages: low rate of wear; fine heat-transfer characteristics; high corrosion resistance.



Air-Cooled "Lake" Oil. Air cooling lowers oil temperatures—reducing carbon, minimizing gum formations, and adding to the efficient serviceable life of working parts.



Independent Starting Engine of exclusive "Caterpillar" design gives safe-and-sure starts at all times, and allows the Diesel to build up full oil pressure before starting.



"Caterpillar"-Built Fuel Injection System is perfectly matched for "Cat" Engines. Pumps and valves require no adjustments, and are replaceable in the field—like spark plugs.



Tapered Spines—specially developed by "Caterpillar"—lock sprockets securely to shafts. So effective have they proved that the principle is similarly applied to other vital parts.



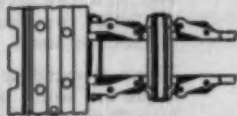
"Hi-Electro" Hardened Final Drive Gears. Teeth are three times harder after treatment and gear life is further boosted by the favorable compressive stress this process supplies.



Bellows Seals are self-aligning, self-adjusting and self-lubricating—keep oil in, dirt and water out without need for take-up adjustment or periodic attention.



Correct Track Alignment, both vertically and laterally, is assured with this rigid roller frame. Heavy diagonal brace and widely spaced bearings add life to tracks and rollers.



Counterbored Track Links—to provide a tighter, better sealed joint and greater bearing surface between bushings and track pins. Extra assurance of long life in abrasive soils!



Hour Meter to give user the facts on tractor performance and life. Hour meters have always been standard on "Cat" Engines because "Caterpillar" has nothing to hide.

CATERPILLAR
DIESEL ENGINES • TRACTORS • MOTOR GRADERS
EARTHMOVING EQUIPMENT



New POWER FEEDS for *Thor* DRIFTERS

SENSITIVE
CONTROL...

✓ Fast feeds, slow feeds (as slow as 2 inches per minute!) rapid return and advance, all controlled from one infinitely variable throttle for top performance under all conditions.

✓ Carbide bit breakage virtually eliminated... even inexperienced drill runners can hold bit against bottom at correct feeding pressure to eliminate bouncing, hard vibration, bit breakage.

AMAZING POWER

On the job demonstrations of new Thor Power Feeds now being arranged! See how these powerful, precision controlled drive units can *save you money*—EXTRA FOOTAGE, LESS MAINTENANCE, FEWER STUCK STEELS, ALMOST COMPLETE ELIMINATION OF BROKEN BITS.

For use with powerful No. 82 and 92 Thor Drifters, new Power Feeds are available in three sliding cone shell lengths—24"x24"; 30"x30"; and in a new stress-proof aluminum shell, 48"x48", weighing actually less than the 30"x30" in steel!

Thor's tremendous advances in Drifting technique are worth investigating—write or wire for a Thor service engineer today! Independent Pneumatic Tool Co., Aurora, Ill.

NEW THOR TOOLS SPEED DRIFTING

AIR BAR FEEDS—for converting hand-feed drifters, and sinkers, to power feed. Simple, efficient.

SINKER LEGS—new "clamp-on" air feed leg permits sinkers to do double duty—drilling down holes and drifting. Standard or reverse feed.

PNEUMATIC COLUMNS—simplify drifter set-ups. Safety features prevent accidental collapse.

Air Feed
Legs

Backfill
Tampers

Belt
Sanders

Bench
Grinders

Chipping
Hammers

Concrete
Surfacing

Clay
Diggers

Drills

Grinders

Electric
Hammers

Impact
Wrenches

Paving
Breakers

Pile
Driver

Rock
Drills

Sanders

Saws

Sump
Pumps

Wagon
Drills

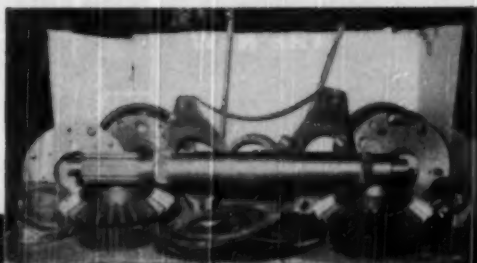


PORTABLE POWER

TOOLS

ELECTRIC • PNEUMATIC

LESS clutch maintenance



MORE loader output . . .

Superla Mine Lubricants

CLUTCH REPAIRS costs down 50% . . . no delays for "warming up" loaders . . . easier and faster loading . . . these benefits have been brought to midwest mines by SUPERLA Mine Lubricants. Here's why these products will assure similar benefits for you.

SUPERLA Mine Lubricants keep transmission cases clean. Clutches operate easily with no gumming or coking caused by oil deposits. When machines are started, these lubricants flow readily between clutch plates, protect them against wear, eliminate "clutch drag" and the necessity for warming up loaders. During long

periods of continuous operation, SUPERLA Mine Lubricants do not thin out excessively, provide safer lubrication for clutch plates.

A test of SUPERLA Mine Lubricants will prove their ability to keep your loaders on the job longer with less maintenance. These products are available in oil and grease grades suitable for any type of cutter or loader. A Standard Oil Lubrication Engineer will gladly help you select the proper grades for your equipment.

Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD OIL COMPANY (INDIANA)



THE NEW

Edison

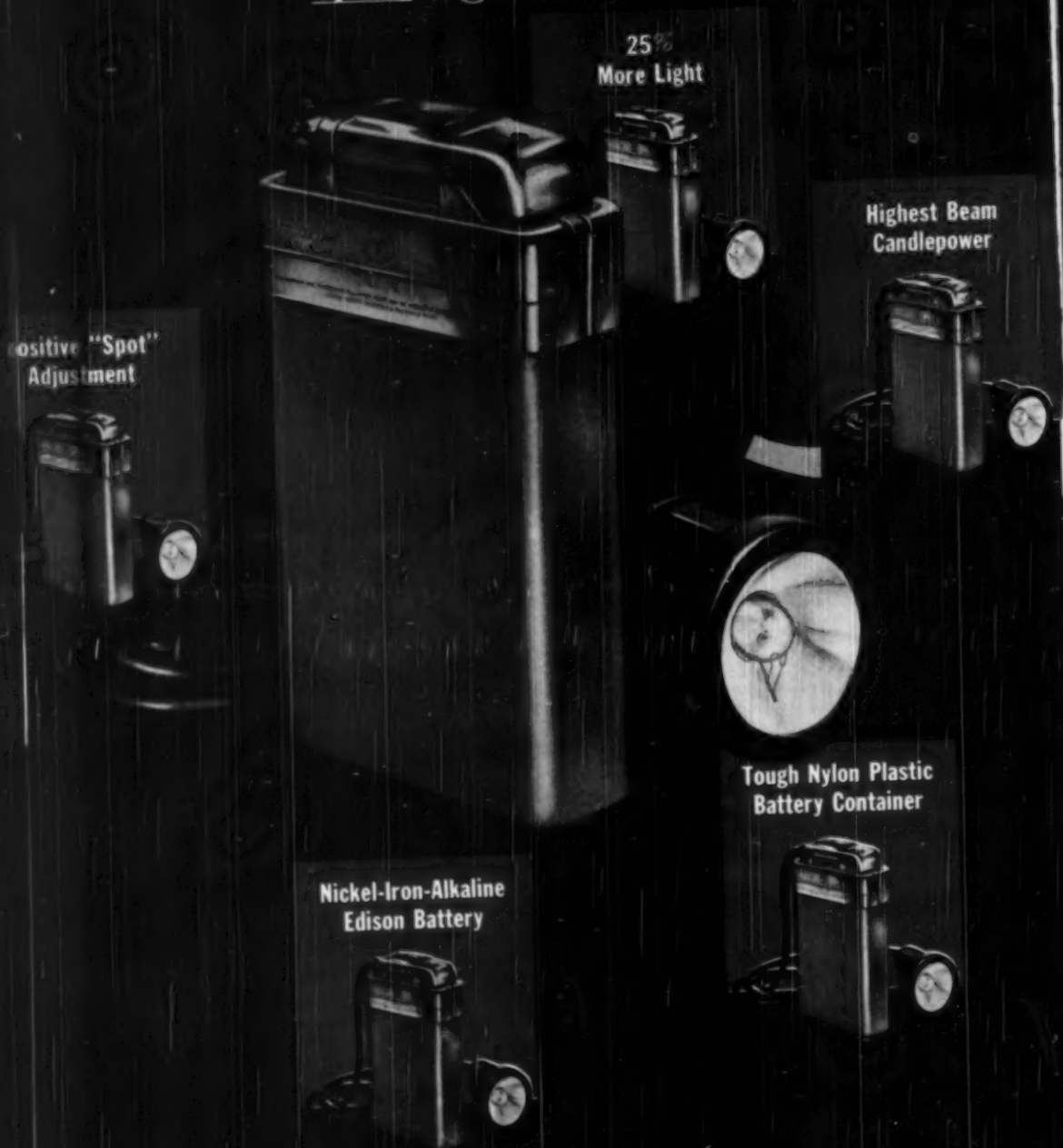
25%
More Light

Highest Beam
Candlepower

Positive "Spot"
Adjustment

Tough Nylon Plastic
Battery Container

Nickel-Iron-Alkaline
Edison Battery



First and Foremost
with dependable, effective light for the miner!

Model **R-4** Electric Cap Lamp

The latest and finest development of the world-famous EDISON Electric Cap Lamp is the new R-4 that gives you more!

More light... even greater dependability... increased effectiveness... enhanced durability—all are yours in Model R-4, new from headpiece to battery case, for finer safety and better mining efficiency.

Let us prove to you how R-4's many extra advantages can benefit your own operation. We'll gladly arrange an on-the-job demonstration—write!

MINE SAFETY APPLIANCES COMPANY

BRADDOCK, THOMAS AND MEADE STREETS PITTSBURGH 3, PA.

At Your Service: 48 BRANCH OFFICES in the UNITED STATES

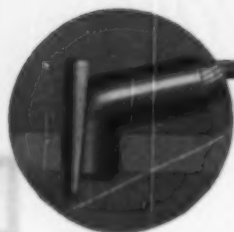
MINE SAFETY APPLIANCES CO. OF CANADA LIMITED — Toronto, Montreal, Calgary, Winnipeg, Vancouver, New Glasgow, N.S.

MINE SAFETY APPLIANCES CO. (S.A.) (PTY.) LTD. — Johannesburg, South Africa; Ndola, N. Rhodesia; Bulawayo, S. Rhodesia

Representatives in Principal Cities in Mexico, Central and South America CABLE ADDRESS, "MINSAP" PITTSBURGH

Tigerweld Bonds keep power flowing

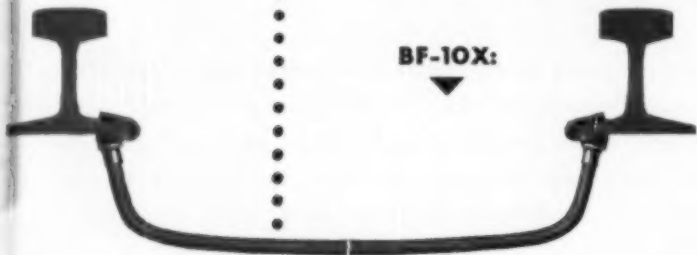
These sturdy, U-S-S Tigerweld Rail Bonds have proved their superiority on hundreds of miles of heavily-traveled, electrified mine track. They maintain constant voltage, reduce power loss.



Wedge-Type: The American Wedge-Type Bond is primarily designed for quick installation on tracks that may have to be moved, but this durable bond holds so well that many mines use it for permanent installation. It can be installed in a few minutes with a high speed drill and a 3-pound hammer. In spite of its ease of installation, the wedge-type bond holds with a grip that won't shake loose. But if you want to remove the bond from temporary trackage, you can hammer it out as easily as you put it in.



BF-10: The BF-10 Power Bond is designed for quick permanent installation by welding. Just drive it on to the base of the rail and it stays in position ready to weld. No special clamp is necessary. Your maintenance crews can install more bonds per day at lower cost. And once the BF-10 Bonds are installed they're on to stay!



BF-10X:

The BF-10X is a cross bond with self clamping terminals to make installation easy. The terminals can be secured to the rails by a few taps of a hammer. And they stay firmly in place while the steel-to-steel weld is applied. The BF-10X Bond has great resistance to fatigue stresses. It can be reclaimed and used again and again.

All of these bonds are butt-welded. That means that in every case all the wires are electrically connected—permanently—to the solid end piece. Butt-welding will consistently develop almost full strength of the strand on a tensile test to destruction. So always specify Tigerweld Bonds. They're *all* butt-welded!

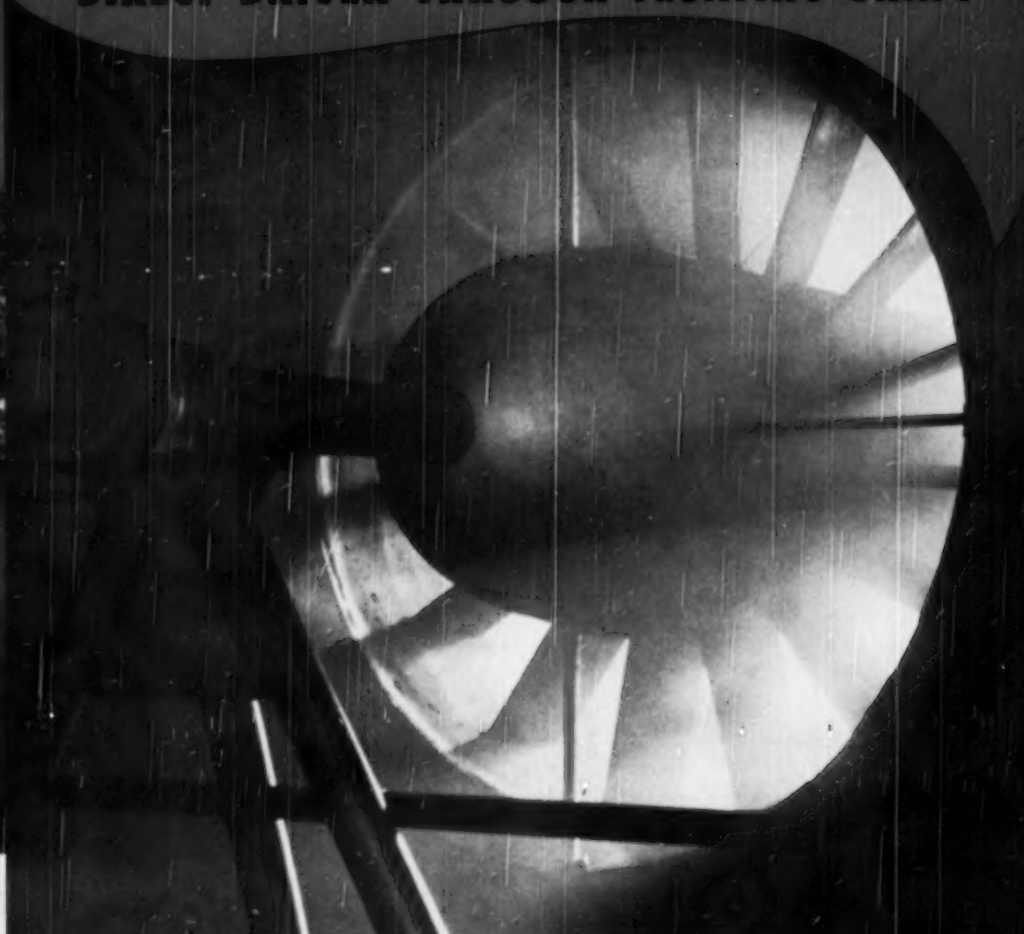
AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA STEEL COMPANY, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM, SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK



American Tigerweld Rail Bonds

UNITED STATES STEEL

JEFFREY 8H117 AERODYNE® FAN DIRECT DRIVEN THROUGH FLOATING SHAFT



Arranged for exhaust operation in a large Anthracite mine in Pennsylvania, this Jeffrey 8H117 **AERODYNE** Fan is direct driven through a floating shaft with flexible couplings. A 350 H.P., 3-phase, 60-cycle induction motor at 580 R.P.M. Adjustable, cast aluminum-alloy Blades permit variable fan output—can be locked in any one of numerous positions. Ultimate duty at 350,000 c.f.m. at 4.5 inch W.G. in No. 4 blade position. If it's ventilation . . . call in an experienced Jeffrey engineer.

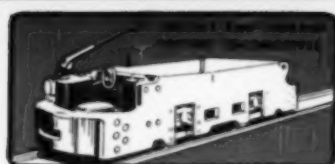
• The **AERODYNE** fan shown here is part of a twin installation using two SH117 Jeffrey Fans, arranged for exhaust operation and designed for maximum potential capacity up to 1,000,000 c. f. m. at 5-inch W.G. It's fresh air that counts 'down under' . . . don't take less than that . . . take a Jeffrey **AERODYNE**



WHEREVER COAL IS MINED YOU



YOU'LL FIND JEFFREY EQUIPMENT



JEFFREY

EQUIPMENT

FOR COAL MINES

THE JEFFREY MANUFACTURING COMPANY

Established 1877

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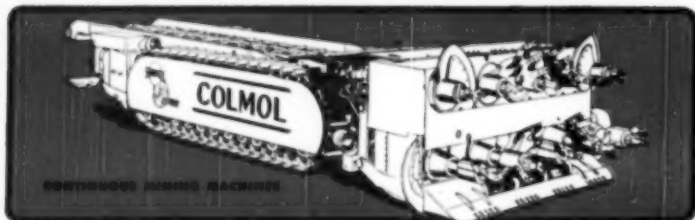
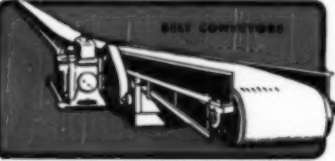
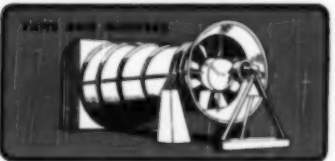
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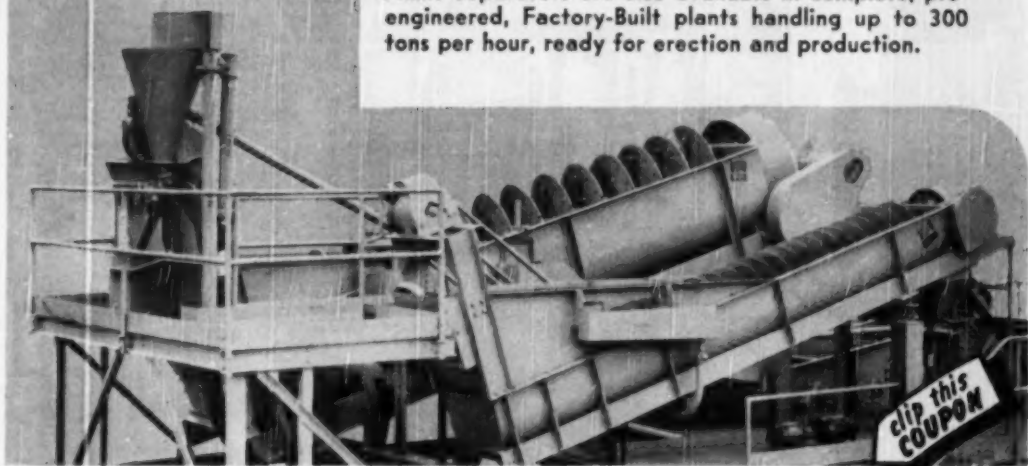
- 1 BETTER
QUALITY
COAL**
- 2 LESS
HAND
LABOR**
- 3 MORE
COAL
PER
DOLLAR**
- 4 EASIER
MECHANIZATION**

With an AKINS HMS SEPARATORY VESSEL

Whatever your tonnage—whatever your present cleaning methods—you can improve your output and cut your costs by adding an AKINS SEPARATOR installation to your preparation plant. The Akins Separator makes a three-product (sink, float and middlings) separation in one step. Use the middlings to grade your coal to your market, or use them to fire your own boilers for heat and power.

It will pay you to replace your existing separatory vessel with an Akins Separator and take advantage of the three-product separation.

Installed costs for the Akins are low. Get complete information now. Write for CIW Bulletin No. 49. Akins Separators are also available in complete, pre-engineered, Factory-Built plants handling up to 300 tons per hour, ready for erection and production.



DENVER 2, COLORADO
Ninety Years' Service to Mining
1860—1950

COLORADO IRON WORKS CO.

1626 17th St.

Denver 2, Colo.

Please send me your free Bulletin No. 49. I am interested in:

- ☐ Replacing or supplementing our existing cleaning equipment ☐ Factory-Built equipment to handle up to 300 tons per hour total feed
- ☐ Original cleaning equipment

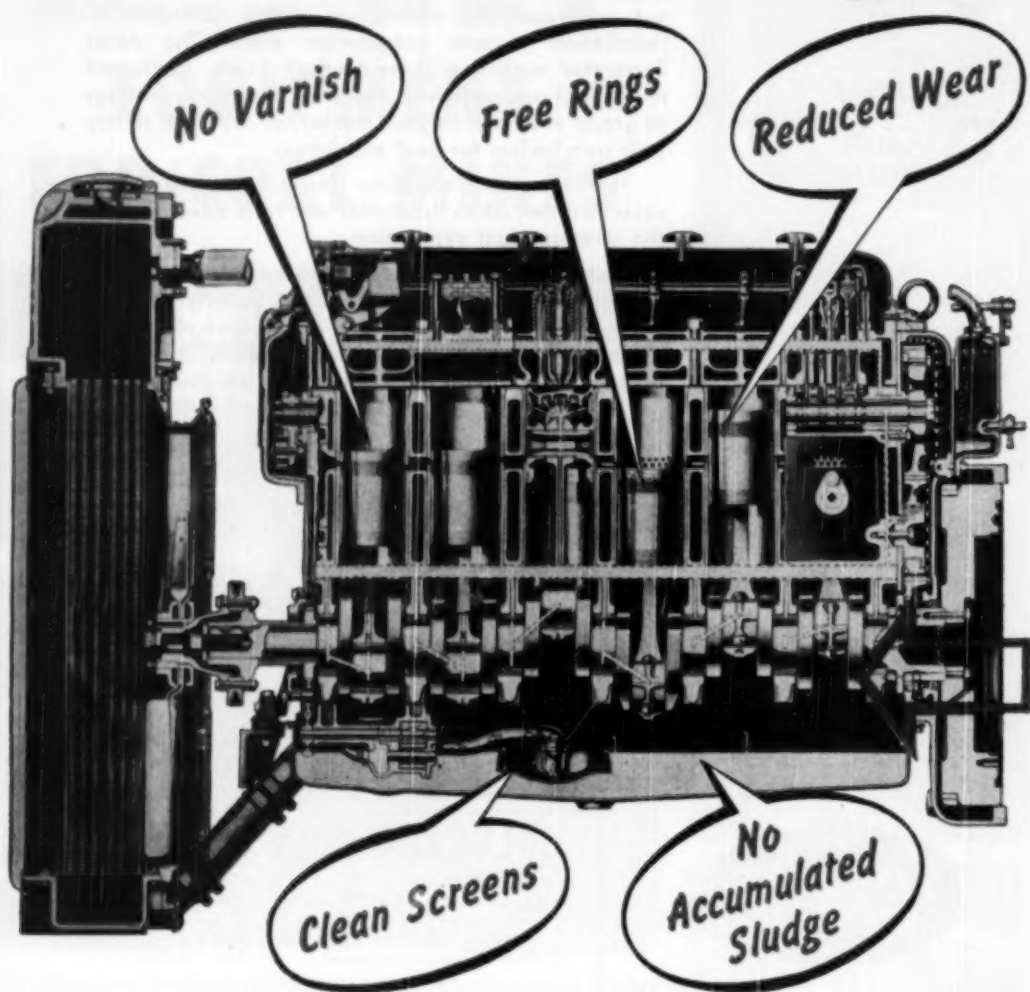
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In SEVERE DUTY.. Can Double Engine



SINCLAIR HEAVY

Your Nearest Supplier of Sinclair Products Will Gladly Arrange for Lubrication

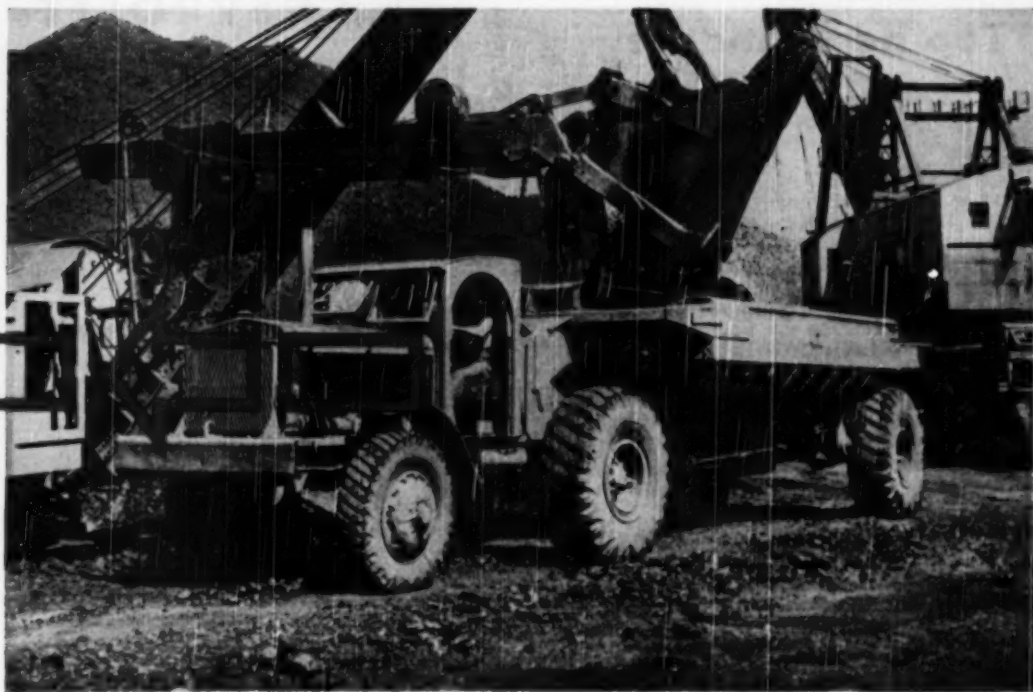
. New *SUPER TENOL* **Life Between Overhauls**

New Sinclair **SUPER TENOL** is an oil specially developed to eliminate the high maintenance costs so frequently encountered in both types of "severe duty" service: — 1. High temperature, high speed, over-load; and 2. Low temperature, light load, long idle, stop-and-go.

Under these abnormal conditions, operators

report new **SUPER TENOL** has more than **DOUBLED** the life of their equipment between overhauls.

If you operate diesel-powered or gasoline equipment in severe duty service it will pay you to change to new **SUPER TENOL** now—to keep equipment in operation many more days each year, to save time, labor and money.



DUTY LUBRICANTS

Counsel or Write to Sinclair Refining Company, 630 Fifth Avenue, New York 20, N. Y.



Top performance for tough jobs!

Chevrolet P.L. Truck performance consists of many things. There is Chevrolet design—brilliant and functional—design with a purpose. There is Chevrolet construction—sturdy and dependable—for lasting usefulness.

And there is Chevrolet power—power to deliver the goods—more power than Chevrolet trucks ever had before. Two great valve-in-head engines—the Load-Master 105 h.p. and the Thrift-Master 92 h.p.—make these the most powerful Chevrolet trucks ever built.

These new P.L. models are far ahead in features, too; yet they cost surprisingly little to buy, to operate, to maintain. And that adds up to value—the kind of outstanding value that year after year makes Chevrolet America's fastest selling truck.

CHEVROLET MOTOR DIVISION, General Motors Corporation, DETROIT 2, MICH.

LEADING WITH ALL THESE PLUS FEATURES:

- **TWO GREAT VALVE-IN-HEAD ENGINES:** the New 105-h.p. Load-Master and the Improved 92-h.p. Thrift-Master—to give you greater power per gallon, lower cost per load
- **THE NEW POWER-JET CARBURETOR:** smoother, quicker acceleration response
- **DIAPHRAGM SPRING CLUTCH** for easy action engagement
- **SYNCHROMESH TRANSMISSIONS** for fast, smooth shifting
- **HYPOID REAR AXLES**—5 times more durable than spiral bevel type
- **DOUBLE-ARTICULATED BRAKES**—for complete driver control
- **WIDE-BASE WHEELS** for increased tire mileage
- **ADVANCE-DESIGN STYLING** with the "Cab that Breathes"
- **BALL-TYPE STEERING** for easier handling
- **UNIT-DESIGN BODIES**—precision built.

CHEVROLET P.*L.*

ADVANCE-DESIGN TRUCKS

Popularity Leaders

Chevrolet trucks outsell all others. In every postwar year truck users have bought more Chevrolets than any other make—proof of the owner satisfaction they have earned throughout the years.

Performance Leaders

The new Chevrolet P.L. trucks give you high pulling power over a wide range of usable road speeds—and on the straightaway, high acceleration to cut down total trip time.

Payload Leaders

The rugged construction and all-around economy of Chevrolet P.L. trucks cut operating and repair costs—let you deliver the goods with real reductions in cost per ton per mile.

Price Leaders

From low selling price to high resale value, you're money ahead with Chevrolet trucks. Chevrolet's rock-bottom initial cost—outstandingly low cost of operation and upkeep—and high trade-in value, all add up to the lowest price for you.



PARIS MANUFACTURING COMPANY

Announces

THREE NEW DRILLS

The **PARMANCO** Coal Drill will drill $2\frac{1}{4}$ inch holes at a speed of up to six feet per minute in #5 coal. Equipped with heavy duty truck-type transmission and rear end and a complete hydraulic feed, the drill is operated by one man from the control seat. It is made in two sizes with a 12 h.p. or 25 h.p. gas motor and all units are completely self-contained and enclosed in oil-tight cases.

ALREADY USED by

United Electric Coal Companies & East Coal Mining Co. 1
Ayrshire Collieries Corp. 2 Huntville Blount Mining Co. 4
Big Bend Collieries, Inc. 1 Trans-Texas Coal Company 1
Little Sister Coal Corp. 1

**THIS UNIT IS DELIVERING 6-INCH SHOT
HOLES — READY FOR LOADING
at Better Than a Foot a Minute !!!**

The new **PARMANCO** Hi-Speed Horizontal Drill is completely redesigned around a 40 h.p. engine with four drilling speeds which, in field tests, has cut one-third off the footage drilling time — a cost-per-drilling-foot saving that we are passing on to the strip mine operator and contractor at no increase in our price. In addition the drill is equipped with a starter and generator, dual type front wheels, truck type rear axle with mechanical brakes and a traction drive with both forward and reverse.

**PARIS
MANUFACTURING
COMPANY
Paris, Illinois**



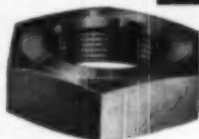
Toothed Lock Washer: Prevents loss of stem nut due to vibration, thereby holding the handwheel securely.



Newly Designed Handwheel: Air-cooled, finger grip handwheel affords sure grip even with greasy gloves.



Improved Packing: Molded packing of lubricated asbestos reinforced with copper wire. Suitable for practically every service. Valves can be repacked under pressure.



Hexagonal Union Bonnet Connection: Eliminates any chance of distortion or leakage even though valve is repeatedly taken apart and assembled.



New Cylindrical Disc Holder: The design of the top portion of the disc holder keeps the disc accurately guided under all operating conditions.

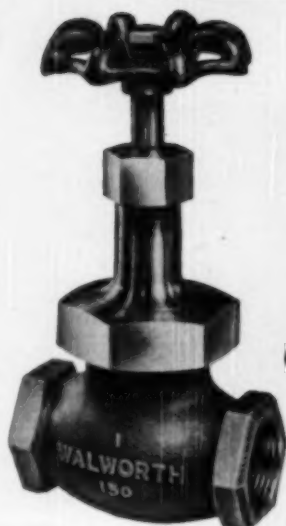


Renewable Asbestos Disc: This disc is suitable for steam up to 500F and is resistant to oil, gasoline, and many chemicals at atmospheric temperatures. Discs for special services are available.



Extra Strong Body: Made of Composition M (ASTM B61) bronze thick enough to provide a high safety factor. Valves undergo hydrostatic shell test of 450 psi.

WALWORTH



IMPROVED

No. 95

BRONZE

GLOBE VALVE

also available in
Angle Type (No. 96)

The service ratings of the Walworth No. 95 are 150 pounds per square inch steam at 500F, and 300 pounds per square inch non-shock cold water, oil, and gas. In the manufacture of this quality bronze valve, more than 47 gages are used in machining parts to micrometric accuracy, thus insuring interchangeability of parts. For further information see your local Walworth distributor, or write: Walworth Company, 60 East 42nd St., New York 17, N. Y.

note these 7 Great Features

WALWORTH **valves and fittings**

60 EAST 42ND STREET

NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

BIGGEST WIRE ROPE NEWS IN YEARS!

2 NEW WIRE ROPES
PROVE COMPLETELY SUPERIOR AND LONG-LIVED
ON EXCAVATING MACHINES

AFTER THE TOUGHEST TESTS in actual service, the new Roebling 6 x 43 and 6 x 49 Wire Ropes are ready to help you get things done with remarkable savings of wire rope dollars. These two new ropes are exclusive developments and made only by Roebling. As hoist ropes on shovels and draglines and as thrust and counterweight ropes on shovels they have proved in a class by themselves.

The new 6 x 43 and 6 x 49 are Blue Center Steel Lang Lay, with Independent Wire Rope Core and Roebling Preforming. Outside wires are *large*, for greatest resistance to wear and tear and abrasion...inside wires are *small*, for maximum flexibility, handling ease and operating efficiency. This type of construction spells extraordinary efficiency and completely new measures of economy for users of medium and large size shovels, draglines, and dredges.

Have your Roebling Field Man help choose the right rope for your machines. He is in close contact with Roebling Engineers...and this team is constantly solving every type of wire rope problem. *That's why...*

Today it's Roebling!



ROEBLING

A CENTURY OF CONFIDENCE

Atlanta, 934 Avon Ave. * Boston, 51 Sleeper St. * Chicago, 5533 W. Roosevelt Road * Cincinnati, 3253 Franklin Ave. * Cleveland, 791 St. Clair Ave., N. E. * Denver, 4001 Jackson St. * Houston, 6216 Navigation Blvd. * Los Angeles, 216 S. Alameda St. * New York, 19 Rector St. * Philadelphia, 12 S. Twelfth St. * Portland, 1032 N. W. 10th Ave. * San Francisco, 1740 Seventeenth St. * Seattle, 900 First Ave. S.

JOHN A. ROEBLING'S SONS COMPANY, TRENTON 2, NEW JERSEY

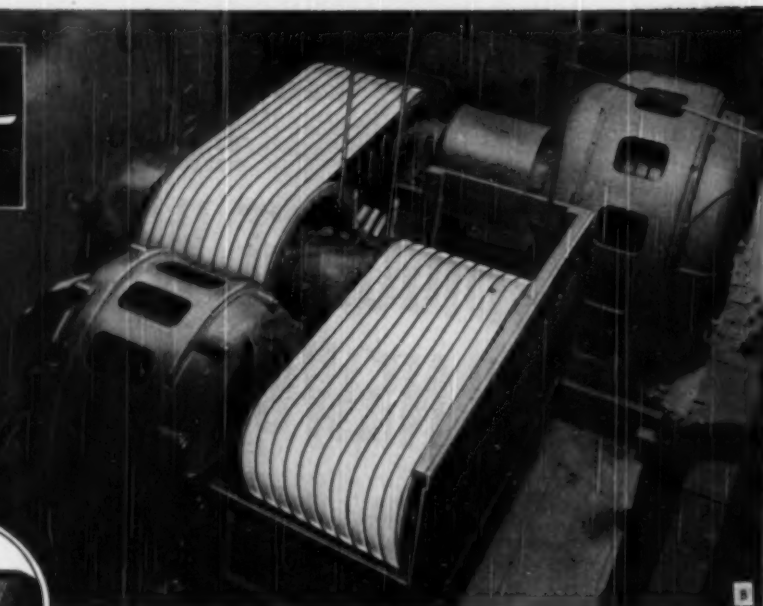


Gates

The Mark of SPECIALIZED Research



The Concave Side
U.S. Patent No. 2,127,000



The motor in the background transmits 600 horsepower through a hollow shaft to one impeller of this crusher while the motor in the foreground transmits 600 horsepower to the other impeller turning it in the opposite direction. The Gates Vulco Ropes absorb the terrific shocks encountered when hard copper ores are crushed between these impellers—are not bothered by the dust condition present.

Here is exactly WHY the Concave Side Saves You Money in V-Belt Costs

When any V-belt bends in going around its pulley, it is forced to change its shape.

Naturally so, because the top of the belt is under tension and grows narrower while the body, under compression, bulges out!

This change of shape in a straight-sided V-Belt, is shown in figures 1 and 1-A—and you will note how the bulging sides press unevenly against the V-pulley.

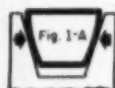
Now look at figures 2 and 2-A. There you see how this change of shape, due to bending, affects the belt that is built with the Concave Side—the Gates Vulco Rope. The precisely engineered Concave Side exactly corrects the side-bulge—and the bent belt has a shape that exactly fits its sheave groove!

Two distinct savings result. First—There is no side-bulge to cause uneven wear. The sides press evenly against the V pulley and therefore wear uniformly—resulting in longer life! Second—The full width of the sidewall grips the pulley—thus carrying heavier loads without slippage—and this saves belts and also saves power!

When you buy V-Belts, be sure you get the V-Belt with the Concave Sides...the Gates Vulco Rope!

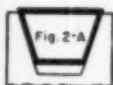
What Happens When a V-Belt Bends

Straight-Sided V-Belt



How Straight Sided V-Belt Bulges in Sheave-Groove. Sides Press Unevenly Against V-Pulley Causing Extra Wear at Point Shown By Arrows.

Gates Vulco Rope with Concave Side



No Side Bulge. Precise Fit in Sheave Groove. Sides Press Evenly Against V-Pulley—Uniform Wear—Longer Life!

CS-505

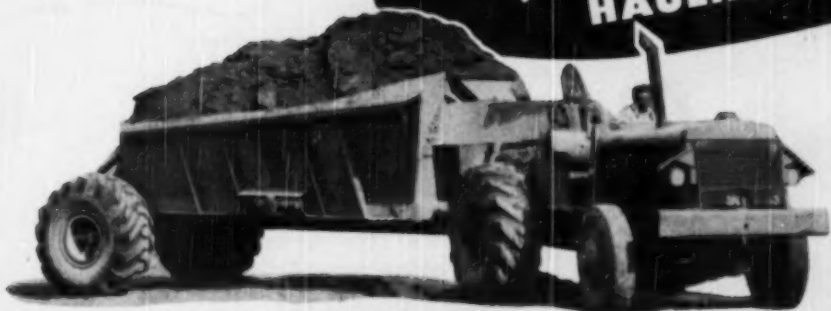
THE GATES RUBBER COMPANY
DENVER, U.S.A.

The World's Largest Makers of V-Belts

GATES VULCO ROPE DRIVES
Engineering Offices and Jobber Stocks IN ALL INDUSTRIAL CENTERS of the U.S. and 71 Foreign Countries

EUCLID

**STANDARD EQUIPMENT
for OFF-THE-HIGHWAY
HAULING JOBS!**



Leading contractors and industrial users of heavy earth moving equipment have standardized on Euclids because they know from experience that "Euclid" increase profits and cut hauling costs. "Euclids sure do the job . . . actually cost less to own than any other hauling equipment," owners say.

Large capacity, dependable performance, and lower operating and maintenance costs have made Euclid the choice for off-the-highway hauling jobs. Designed for a wide range of work, there are models for handling all types of material efficiently . . . earth, coal, ore, rock, and other heavy excavation.

Rear-Dump Euclids range in capacity from 10 to 34 tons and are available with standard or quarry bodies . . . semi-rigid or spring mounted drive axles . . . diesel engines from 125 to 300 h.p. Bottom-Dump models have capacities of 13 to 50 cu. yds., 20 to 40 tons with diesel engines to 275 h.p.

The parts and service facilities of Euclid's world-wide distributor organization assure prompt, efficient service to all Euclid owners. Write today for complete information on the Euclid line or call your distributor for an estimate on your present or future jobs.



THE EUCLID ROAD MACHINERY CO., CLEVELAND 17, OHIO



TOURNADOZER delivers on KAISER-FRAZER



On work like this, Tournadozer's giant, 21.00 x 25, low-pressure tires provide excellent compaction during normal travel back and forth across the stockpile . . . help prevent spontaneous combustion. What's more, the big, soft tires compact the coal without grinding it into "fines."

Kaiser-Frazer Corporation's Tournadozer moves coal from unloading station to adjacent stockpile . . . feeds it as needed to conveyor hopper for power plant. Distances on this operation average 300'.



Feeds 300 tons a day to conveyor...handles 600 tons daily from cars to stockpile . . .

At its Willow Run, Michigan factory, Kaiser-Frazer Corporation has been using a LeTourneau rubber-tired Tournadozer for over a year on coal handling. According to Maintenance and Equipment Superintendent C. P. Olsen the Tournadozer has been 90% efficient over approximately 2100 hours of operation. He adds, "It's entirely reliable . . . has performed satisfactorily . . . and is of exceptional importance to our day-to-day job."

Assures steady operation of power plant

As required, Tournadozer feeds coal from stockpile to conveyor for power house bunkers, easily delivers 300 tons daily . . . all the conveyor can handle. When assigned to stockpiling, the big, rubber-tired Dozer moves approximately 600 tons of coal a day over average 300' one-way push from rail car unloading station to storage pile. Here, again, Tournadozer has plenty of reserve



For more TOURNADOZER information . . . write R. G. LeTOURNEAU, Inc., Peoria, ILL.

We're interested in: ☐ specifications ☐ price, delivery information ☐ production analysis on present operation

NAME

TITLE

COMPANY

DEPT. OR DIV.

STREET

CITY, STATE

Type of work, materials to be handled

90% efficiency over 2100 hours *coal stockpile operation*



production capacity to exceed unloading facilities . . . easily keeps ahead of stockpiling and hopper requirements to assure steady operation of the power plant.

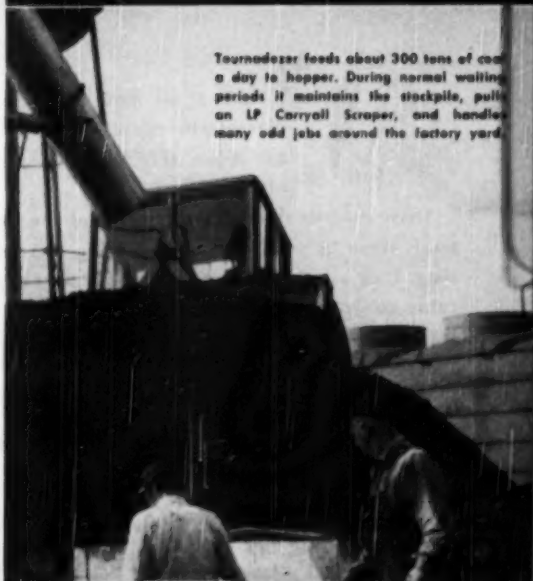
Also pulls 15-yd. Carryall on coal stockpiling

Kaiser-Frazer Corporation often uses its Tournadozer with a LeTourneau 15-yard LP Carryall Scraper to load, haul and spread on the stockpile. Timed on 2,000' cycles, the Tournadozer-Carryall team averaged 10 loads an hour. This same outfit also excavates and levels disposal areas for scrap and debris from the factory. Other spare-time jobs handled by the Tournadozer include: building parking lots and roads . . . leveling dumps . . . cleaning snow off roads and drive-ways around the plant 'n the winter.

Because the Tournadozer runs fast on rubber tires it handles many of these extra jobs after handling hopper requirements. It can be driven anywhere on or off pavement . . . runs ½ mile in only a few minutes . . . gets there, gets job done, and hurries back.

Tournadozer can show similar savings on your work. Whether you are interested in ownership, or want to locate the nearest Tournadozer contractor to handle special jobs like these, your LeTourneau Distributor is ready to help you. Call him TODAY.

4-wheel drive on rubber, plus instant, non-stop speed selection, enables Tournadozer to keep rolling in 2nd gear, while carrying capacity loads ahead of the 2½-yard blade. Same fast speeds forward are also available in reverse . . . make Tournadozer 2 to 3 times more productive than crawlers.



Tournadozer feeds about 300 tons of coal a day to hopper. During normal waiting periods it maintains the stockpile, pulls an LP Carryall Scraper, and handles many odd jobs around the factory yard.

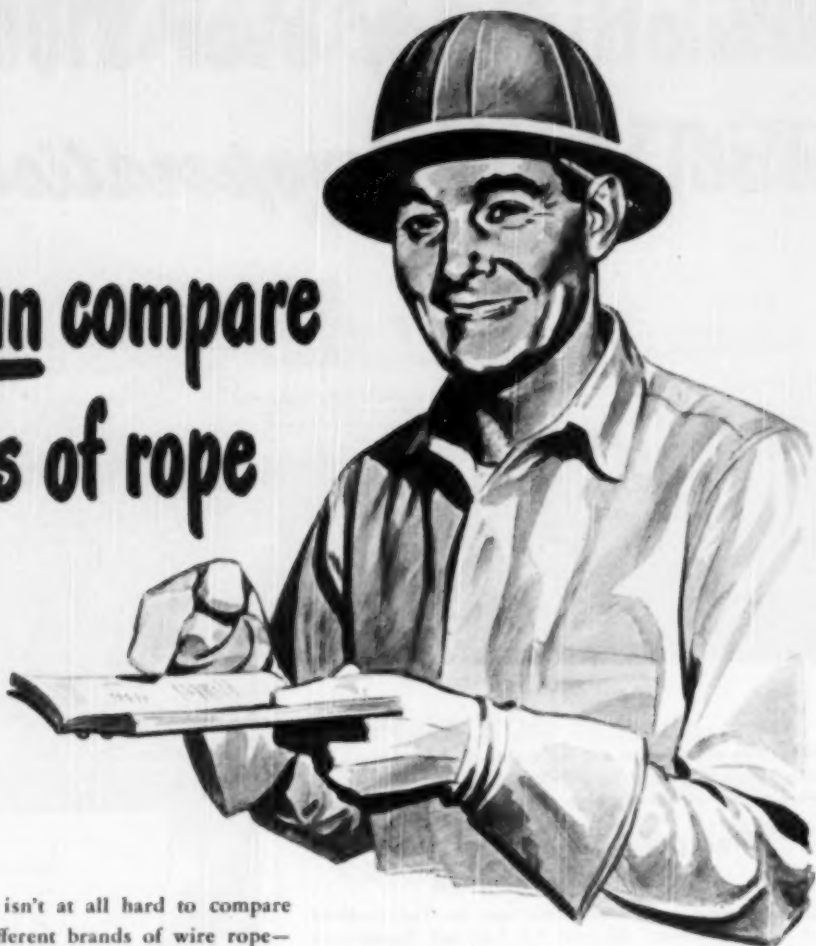
LETOURNEAU
PEORIA, ILLINOIS



TOURNADOZERS

IT'S RUBBER THAT PUTS THE ACTION IN TRACTION

You can compare brands of rope



It isn't at all hard to compare different brands of wire rope—not if you keep a simple system of records.

These records should, of course, show the work totals done by your wire ropes during their lifetime. Pick as a basis the unit of work most applicable to your line of business—a ton-mile, for instance, in oil-country drilling; a cubic yard of

rock moved; a car of coal hauled up a slope, etc. When the ropes have finally been retired from service, see how much—or how little—their cost has been per unit of work.



Bethlehem has always advocated the keeping of such records. One reason (we admit it freely) is that Bethlehem wire rope is an *economical* rope, and your records will prove it. We welcome comparisons with anybody's product.



**BETHLEHEM
STEEL**

**LET YOUR RECORDS
TELL YOU!**

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributors: Bethlehem Steel Export Corporation



DIVIDE BY TWO— and *GET MORE* than you had before

FUEL consumption was cut in half and production doubled when a 4-cylinder GM Series 71 Diesel replaced gasoline power in this Northwest one-yard shovel.

The machine handles 1200 tons of limestone and uses only 35 gallons of fuel oil in an 8-hour day, as compared to 600 tons using 75 gallons of gasoline with the old engine. R. W. Meyer, president of Riverview Stone & Material Co., St. Louis, reports moving 400,000 tons of rock without engine overhaul.

"Not only did the General Motors Diesel engine

drastically reduce fuel costs," says Mr. Meyer "but operating speed stepped up considerably. This 15-year-old machine walks right through in tight rock now."

Taking jobs like this in stride is everyday work for GM Diesel-powered equipment. The 2-cycle GM Diesel gives lightning response to power demands, operates on low-cost fuel, and delivers long, economical service.

You'll find it pays to specify GM Diesels for re-powering old equipment or when buying new. Write us or ask your distributor for details.

DETROIT DIESEL ENGINE DIVISION

SINGLE ENGINES . . . Up to 275 H. P. **DETROIT 23, MICHIGAN** MULTIPLE UNITS . . . Up to 800 H. P.

GENERAL MOTORS

DIESEL BRAWN WITHOUT THE BULK



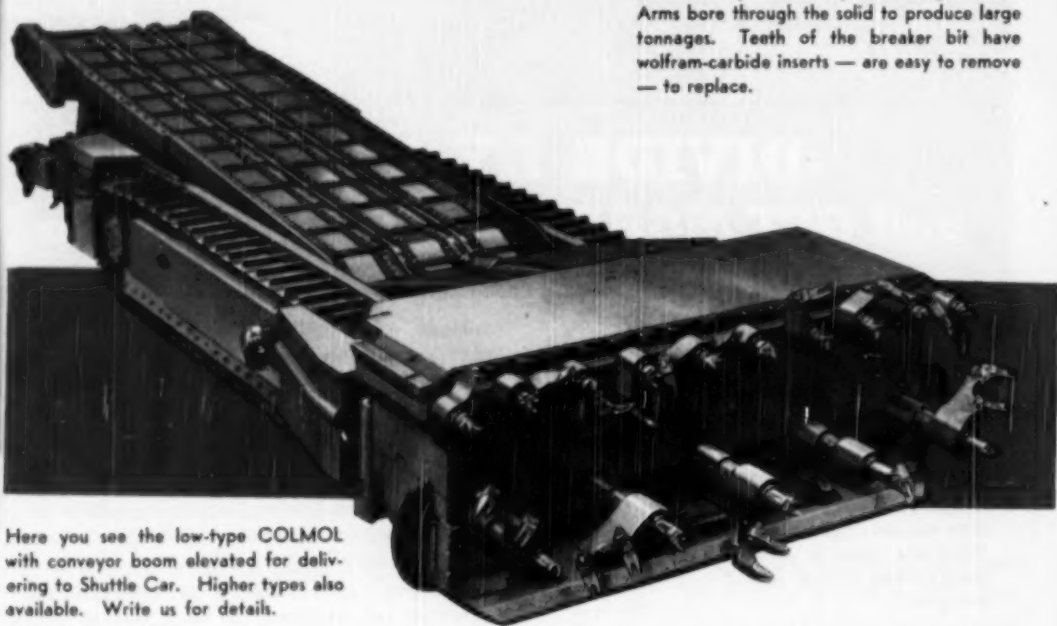
COLMOL

(REMEMBER THE NAME)

Remember, too, that this one-process device brings to the Coal Industry a complete new idea in continuous mining. It takes the place of conventional cutting, drilling and loading machines . . . no shooting required. COLMOL advances the face in one operation — leaves floor clean and uniform — operates with little or no vibration. Let us tell you more about its HIGH PRODUCTION — RUGGEDNESS — ECONOMY OF OPERATION—MANEUVERABILITY and how it can be of great service in any mechanization program.



Above — A close-up of one of the breaker arms. Performing on the business end of the COLMOL (note below) these big Breaker Arms bore through the solid to produce large tonnages. Teeth of the breaker bit have wolfram-carbide inserts — are easy to remove — to replace.



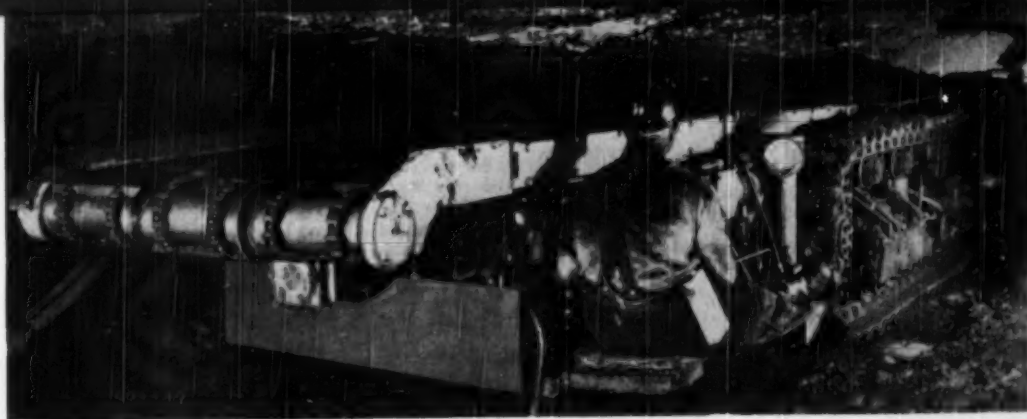
Here you see the low-type COLMOL with conveyor boom elevated for delivering to Shuttle Car. Higher types also available. Write us for details.

The **COLMOL** is engineered, manufactured, sold and serviced by
THE JEFFREY MANUFACTURING COMPANY

912 North Fourth Street, Columbus 16, Ohio



BREAKS AND LOADS IN ONE OPERATION
2 to 5 TONS PER MINUTE



NEW and Heavy-Duty Engineered

TO SAVE YOU MONEY



Whether you haul coal or crushed rock, sand or gravel

You get lower-cost performance, more miles of trouble-free hauling, and longer life from every new International Truck because every new International Truck is **HEAVY-DUTY ENGINEERED**.

Proof of this statement boils down to this:

1. Heavy-duty truck buyers keep records of hauling costs right down to the last penny. On the basis of what these records show, these cost-conscious men have bought more heavy-duty International Trucks than any other make for 18 straight years.
2. The extra values that for almost two decades have assured America's most exacting truck buyers of better performance at lower cost per mile are engineered into every new International Truck from the smallest to the largest.

Every new International Truck from 4,200 to 90,000 pounds gross vehicle weight offers heavy-duty engineered stamina and operating economy combined with new comfort and ease of handling.

You get new comfort and driving ease in the "roomiest cab on the road." Step into the Comfo-Vision Cab

and discover how much more "move-around room" there is in the "roomiest cab on the road." Note how easy it is to adjust the wide seat to just the right position.

Look out through the one-piece, scientifically curved Sweepstake windshield. Place your hands right where they feel natural for driving—and you'll find them gripped around the sturdy steering wheel. And just wait till you start going—you'll enjoy more positive control... thanks to new Super-steering.

You get more all-round truck value in every new International Truck. See the new valve-in-head truck engines, new rear axles, new features throughout—all proved under actual operating conditions. Get the facts about new Internationals—the world's most complete line of trucks.

See for yourself... see your International Truck Dealer or Branch, soon.

International Harvester Builds McCormick Farm Equipment and Farmall Tractors... Motor Trucks... Industrial Power... Refrigerators and Freezers
Tune in James Melton and "Harvest of Stars"—NBC, Sunday afternoons



ALL NEW, ALL PROVED

INTERNATIONAL TRUCKS

INTERNATIONAL HARVESTER COMPANY CHICAGO



CUT YOUR CUTTING COSTS



JOY SULMET COAL-CUTTER BIT



JOY SULMET AUGER BIT

with **JOY** **SULMET BITS**

TUNGSTEN CARBIDE-TIPPED...
with proved ability to give you

- ★ **FASTER** Cutting Speeds
- ★ **MORE** Footage with Fewer Changes
- ★ **LESS** Power used per Place Cut
- ★ **LONGER** Life in Service

LET US SHOW YOU ACTUAL PERFORMANCE RECORDS

Write for Bulletin, or *Consult a Joy Engineer*

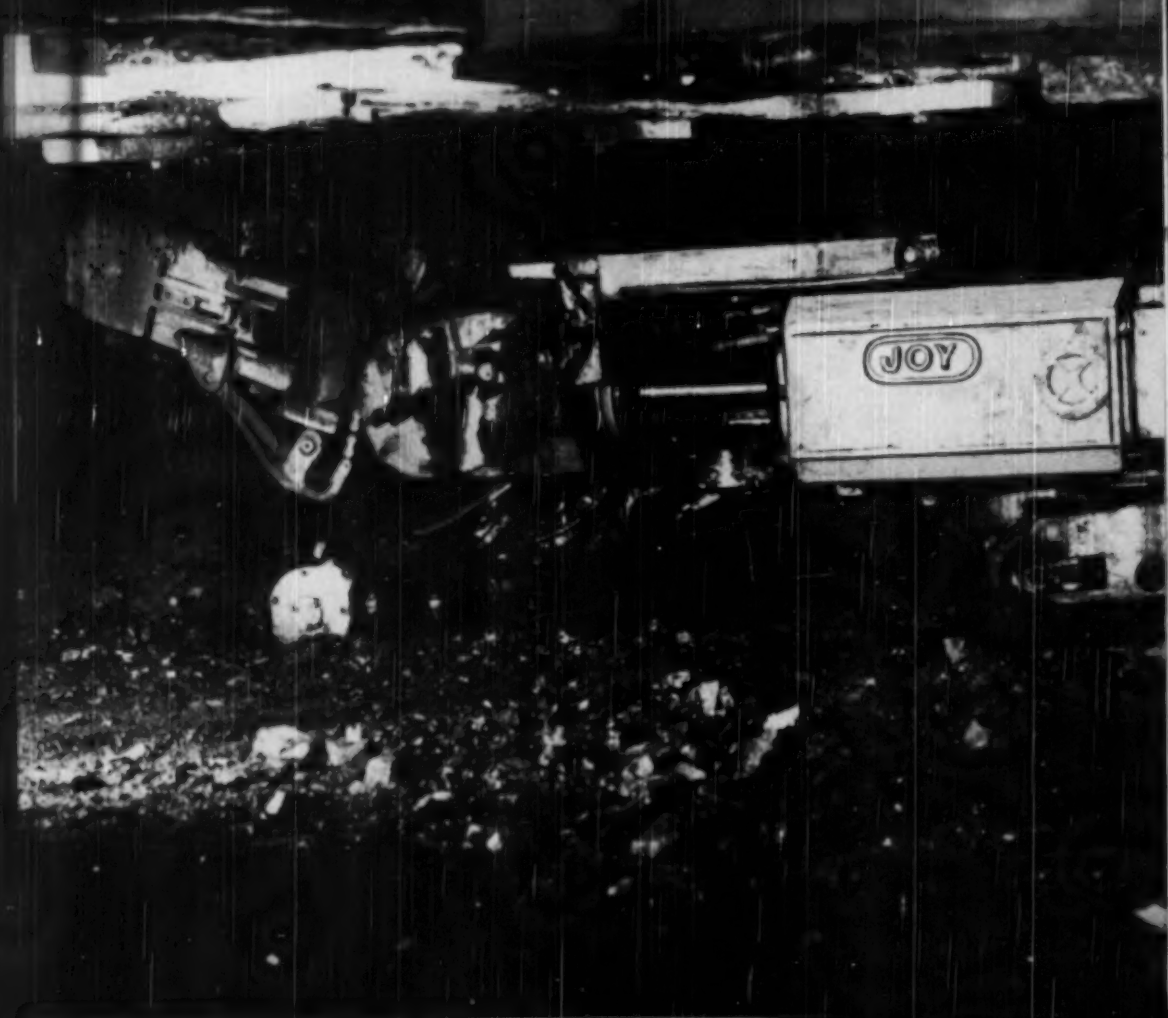


JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING • PITTSBURGH 22, PA.

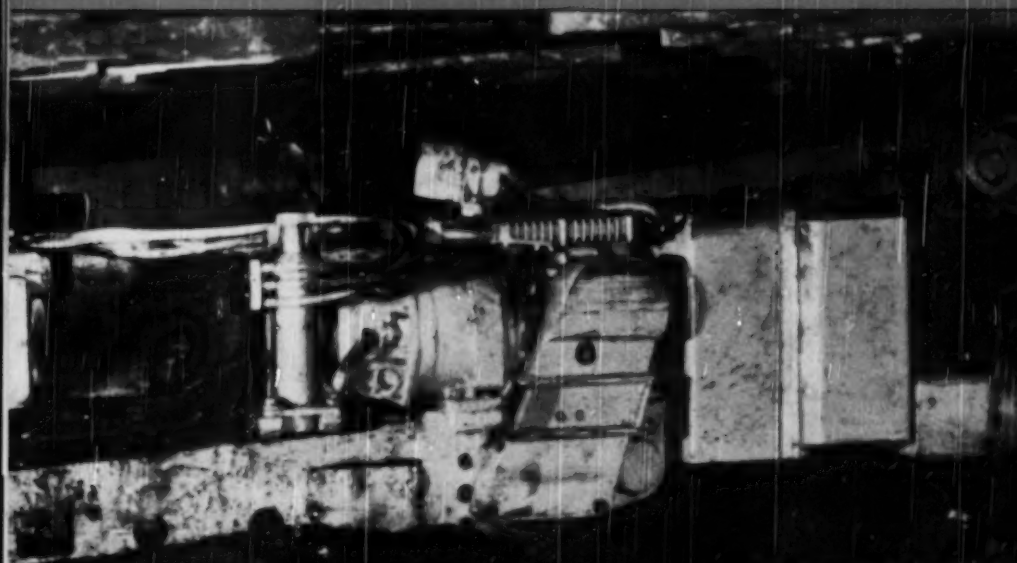
IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

IN THIN SEAMS, OR IN THICK SEAMS...



The **JOY** ▶ **CONTINUOUS MINER**

marks a new era of Efficiency
and Low Cost in Coal Mining



3-JCM Continuous Miner, low coal type, at work in the Gorgas Mine of the Alabama Power Co., Gorgas, Ala.

Consult to a Joy Engineer



W&D CL302

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING • PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO



LOWER MAINTENANCE!


LONGER LIFE!

MORE DEPENDABLE!

A JOY Belt Conveyor providing efficient, reliable main haulage.

JOY BELT CONVEYORS

FOR GATHERING OR MAIN HAULAGE



JOY Belt Conveyors do a highly capable, low cost transporting job, whether out of the entries or over the long haul. Rugged construction, sealed precision bearings which require no lubrication for life, and low power consumption are features that

mean efficient, trouble-free operation . . . a smooth uninterrupted flow of coal with no waiting for empties, no matter how long the haul. • Wherever you need a belt conveyor (or chain and shaker types) use *proved* JOY Equipment for *best* results.

This team moves tonnage fast—a JOY Shuttle Car with elevating discharge unloading onto a JOY Belt Conveyor.

WAD CL 2921

Consult a Joy Engineer



JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING • PITTSBURGH 22, PA.

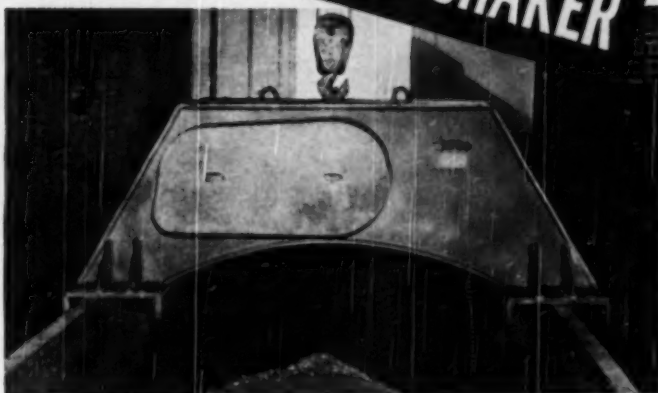
IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

CUT COAL UNLOADING COSTS 2 WAYS

**ALLIS-CHALMERS
CAR SHAKER**

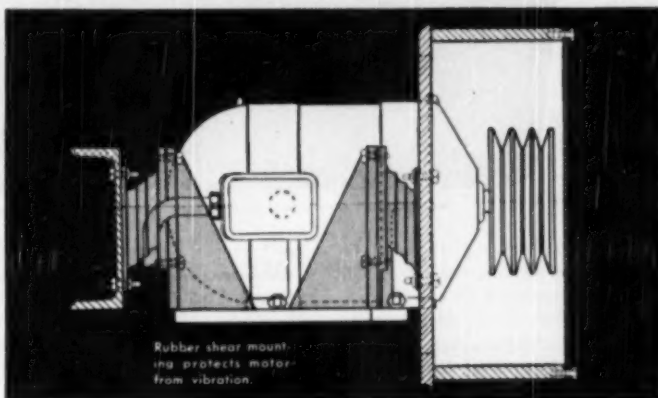
1. SAVE MAN-HOURS

In just a few minutes a hopper-bottom carload of coal screenings can be emptied with the new Allis-Chalmers Car Shaker. Labor is saved at the unloading station. Expensive demurrage costs may be avoided!



2. SAVE MAINTENANCE

Simplified mechanism has minimum of working parts to maintain. Driving motor is 15 hp, high-torque, totally-enclosed...mounted on rubber to protect against vibration! (Note rubber motor mount at right) Steel body is stress-relieved.



HERE'S A CAR SHAKER that is built to withstand severe vibration necessary for fast unloading of bridged and packed coal from hopper-bottom cars.

Its simplified mechanism... its unique arrangement for hydraulically removing self-aligning bearings for replacement purposes... and many other features pay off in low maintenance and long service!

Bulletin 07B7221 gives you more facts. Contact your nearby Allis-Chalmers Sales Office. Or send in the handy coupon.

ALLIS-CHALMERS, 968A SO. 70 ST.
MILWAUKEE, WIS.

A-2909

Please send Car Shaker Bulletin 07B7221.

Name

Title

Firm

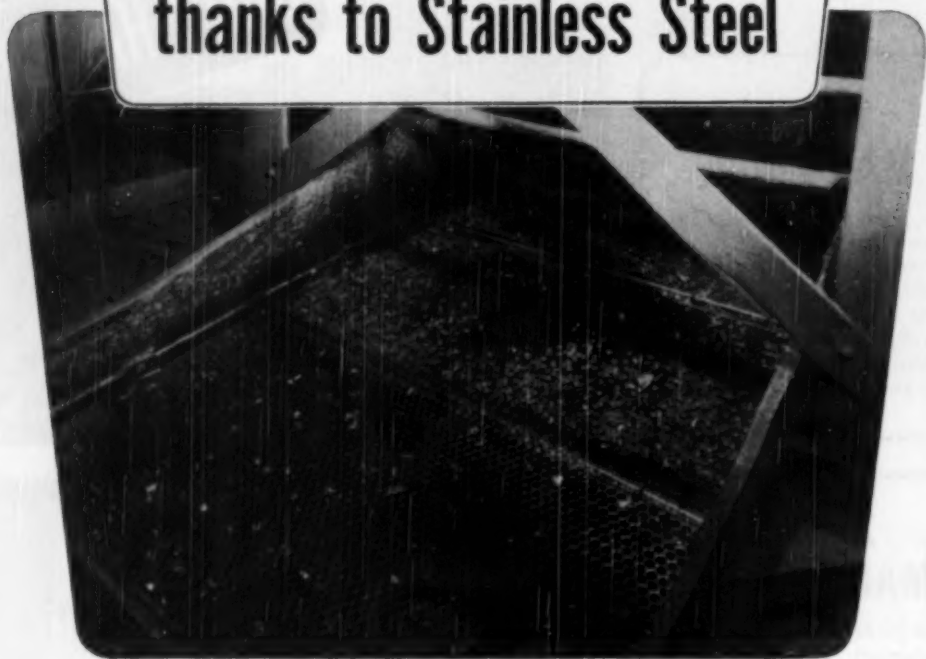
Address

ALLIS-CHALMERS



*Now you can measure screen life
in years instead of months*

thanks to Stainless Steel



The U·S·S Stainless screens on the lower deck of this unit have had an average life of over 3 years.

MORE preparation plant operators are discovering every day that perforated screens made from U·S·S Stainless Steel last far longer under the severe service of sizing, dewatering, and desanding than screens made from other materials.

Pennsylvania Coal & Coke Corporation needed only *three sets* of screens made from U·S·S Stainless Steel in *9½ years* at its Ehrenfeld mine—an average service life of 3

years and 2 months.

And at its Moss Creek mine, Pennsylvania Coal & Coke has had similar results. After three years, U·S·S Stainless Steel screens—16 gage, Type 410—were still in service and in good condition.

U·S·S Stainless Steel screens resist corrosion . . . reduce "blinding" . . . resist wear . . . maintain size . . . slash replacement costs. That's why they classify and desand and dewater

more tonnage at lower cost than screens made from other less efficient materials.

Screens made from U·S·S Stainless Steel are being installed in preparation plants of the industry's largest operators. U·S·S Stainless, a perfected, service-tested material, is available in grades to meet all types of operating conditions. Ask your supplier about U·S·S Stainless Steel screens for your plant.

AMERICAN STEEL & WIRE COMPANY, CLEVELAND • CARNEGIE-ILLINOIS STEEL CORPORATION, PITTSBURGH
COLUMBIA STEEL COMPANY, SAN FRANCISCO • NATIONAL TUBE COMPANY, PITTSBURGH • TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM
UNITED STATES STEEL SUPPLY COMPANY, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST • UNITED STATES STEEL EXPORT COMPANY, NEW YORK



U·S·S STAINLESS STEEL

SHEETS • STRIP • PLATES • BARS • BILLETS • PIPE • TUBES • WIRE • SPECIAL SECTIONS

0-505

UNITED STATES STEEL

How to reduce your maintenance costs



USE

1. Gulf Mining Machine Lubricant B for lubrication—
it does the job of 2 or 3 other lubricants

2. Gulf Journal Oil B for hydraulic systems

These two Gulf quality products for mining machines offer effective help in your efforts to reduce maintenance costs. Here's why:

Gulf Mining Lubricant B and Gulf Journal Oil B not only do the job of several other oils and greases, but do it better! Gulf Mining Machine Lubricant B has a heavy body to insure less leakage from gear cases; exceptional adhesiveness that prevents throwoff or channeling; higher lubricating value that insures less wear; and it resists the washing action of water.

Gulf Journal Oil B gives outstanding protection against wear for hydraulic pumps—helps maintain system efficiency!

Use Gulf Mining Machine Lubricant B and Gulf Journal Oil B for fewer breakdowns of equipment, less time in the shop—which add up to more productive time and greater tonnage.

To get the many benefits possible with these quality products and for expert help on other phases of improved lubrication, call in a Gulf Lubrication Engineer. Write, wire, or phone:

Gulf Oil Corporation • Gulf Refining Company

GULF BUILDING, PITTSBURGH, PA.

Sales Offices • Warehouses

Located in principal cities and towns throughout
Gulfs marketing territory





**Cost and fee
basis of operation
... proved sound
through 39 years**



TOP OF THE FIELD

Every customer that we have served to date has approved our plan of compensation, which has been in effect since our origin. Proof of this full acceptance is indicated by the fact that 80% of our business has been repeat.

Our original cost estimate is made on the basis of current market prices for materials. If any, the variance in our original cost estimate has never been more than slight in either direction. When an adjustment is required, by prices rising or falling, you can easily check its validity.

Being strictly engineers and not manufacturers, we have no equipment for sale. Knowing equipment as we do, we recommend the equipment that will best serve you and you pay but the manufacturer's price.

Our fee arrangement can't help but be favorable to you. A choice of one of two plans is presented. One is a flat fee determined at the time of our estimate. The other is one where we go along with you on a small percentage basis, figured on the final cost of the project. If the costs are lower or higher than the original estimate, our percentage fee naturally varies accordingly.

We make every effort to give you all benefits in cost savings and work to give you the most modern in engineering and construction.

When you are ready, let us know and we will contact you.

Scope of Services

- Design and construction of new plants and their various units.
- Organization, operation and management of mines.
- Below ground modernization and mechanization.
- Reconstruction, re-vamping, or improvement of existing plants.
- General consulting work regarding power, equipment, operation, and various mining problems.
- Valuations for financing, fire loss, taxation purpose—reports and appraisals.

We worked with undivided responsibility to you on a cost and fixed fee basis. We are not hampered by any connections which might prejudice the true professional engineering approach to your problems.

ALLEN & GARCIA COMPANY

CONSULTING AND CONSTRUCTING ENGINEERS

332 S. MICHIGAN AVE., CHICAGO 4, ILL. • 120 WALL ST., NEW YORK 5, N. Y.



Huge one piece BWH Belt DESIGNED TO CUT WASTE LINES!

When BWH engineers were called on to produce a fast, power-saving, economical belt for a coal mine, this 13-ton Silver King ROTOCORD BELT was the result. It's one of the largest one piece conveyor belts ever produced. Made by the famous, exclusive BWH ROTOCURE Process of continuous vulcanization, this giant is 1576 feet long,

48 inches wide. It will haul better than 500 tons an hour on a rugged grade at the fast clip of 400 feet per minute. Maintenance worries are lessened by the absence of splices. It's another top performance by BWH . . . leaders for 71 years in the manufacture of mechanical rubber goods of dependable ruggedness for use in all industries.

HAVE YOU A JOB WHERE STAMINA COUNTS? Bring us your toughest problems. We're specialists in solving them. Consult your nearest BWH distributor or write us direct.

BWH



DEPENDABLE RUGGEDNESS

This is the ROTOCURE Process of continuous vulcanization, exclusive with BWH. It does away with the 30 to 40-foot overlaps occurring in the duck carcass in old-fashioned flat-press curing, eliminates the possibility of operational weakness caused by such overcuring.



Another Quality Product of

BOSTON WOVEN HOSE & RUBBER COMPANY

Distributors in all Principal Cities

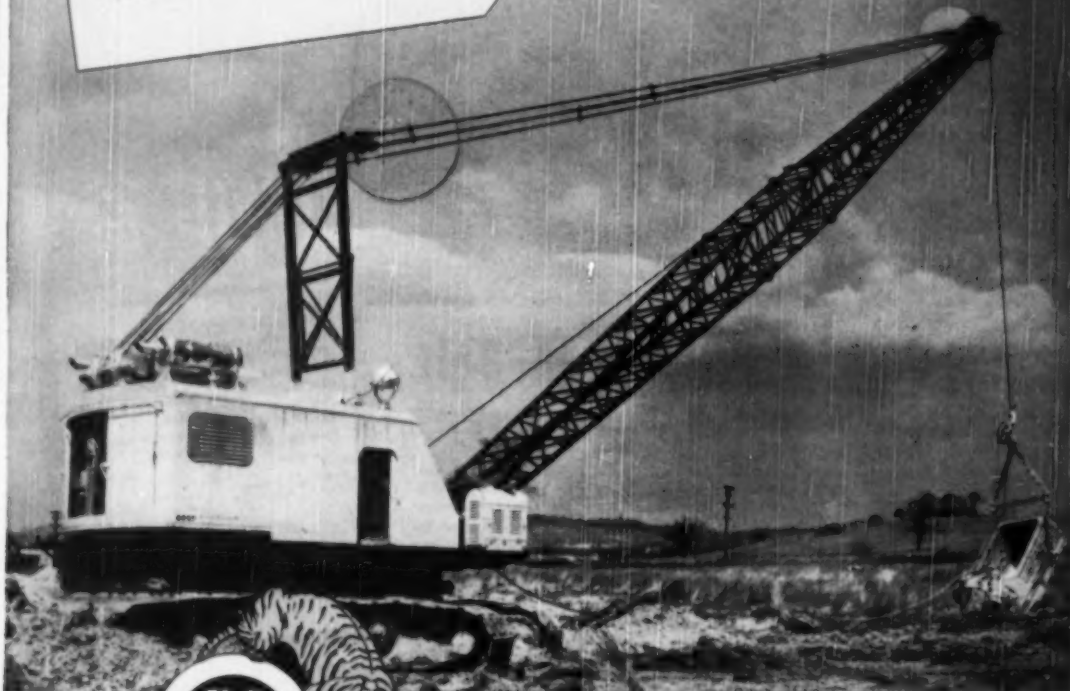
PLANT: CAMBRIDGE, MASS., U.S.A. • P.O. BOX 1071, BOSTON 3, MASS.

2 to 3 times longer

with these new Fatigue-Resistant

REPLACE YOUR OLD BOOM SUPPORTS with these new Tiger Brand FATIGUE-RESISTANT Boom Support Assemblies. Field tests and laboratory vibration tests indicate at least two or three times the usual length of life under the most severe vibration conditions.

An exclusive development of
AMERICAN STEEL & WIRE COMPANY



NEW TIGER BRAND FATIGUE-RESISTANT BOOM SUPPORT ASSEMBLIES on a
5 cu. yd. dragline near Pittsburgh, Pa.

life for boom supports

Tiger Brand Cable Assemblies

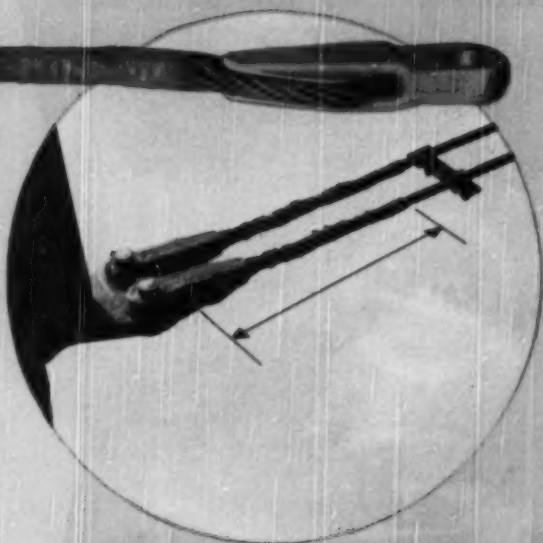
● Here is an "innovation" in boom support assemblies that effectively combats the most severe vibration on power shovels, draglines and cranes. Notice the novel thimble design which embodies an interwoven eye and open end pendant easily and quickly interchangeable on standard equipment.

This new design dampens vibration instead of concentrating it at one point. The result is two to three times longer life for boom supports and much greater safety.

The new boom supports are especially adaptable to installations where fatigue failures occur adjacent to sockets. They can be easily and quickly adapted to your present equipment because essential dimensions such as pin diameters, distances between ears, etc., are the same as for standard open and closed sockets.

Fatigue-Resistant Boom Supports are an exclusive development of American Steel & Wire Company. Send the coupon for complete information.

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES, CLEVELAND, OHIO
COLUMBIA STEEL COMPANY, SAN FRANCISCO
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM,
SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK



VIBRATION EFFECTIVELY DAMPENED HERE over a long section instead of being concentrated at one point.

American Steel & Wire Company
Hockett Building, Dept. J-46
Cleveland 13, Ohio

Please send me complete information on your new Tiger Brand Boom Support Assembly.

Name.....

Title.....

Company.....

Address.....

City..... State.....



AMERICAN TIGER BRAND WIRE ROPE

Excellay Preformed

UNITED STATES STEEL

Rugged

SELF-PROPELLED HORIZONTAL DRILL

Heavy

SALEM

Fast

VERTICAL DRILL

Powerful

COAL RECOVERY DRILL

Top producer of them all . . . *McCarthy Drills*

Hundreds of successful operators rely on McCarthy Drills for their really tough jobs, because they know McCarthy Drills produce more footage at less cost in less time! These rugged machines have proved themselves in every test under the most difficult conditions. List of owners furnished on request.

SELF-PROPELLED HORIZONTAL DRILL

These tough, maneuverable units produce 40% more 6 to 8-inch blasting holes per day as they move about under their own power from hole to hole in the pit. The hydraulically controlled carriage travels a distance of seven feet, eight inches to provide ample clearance for the addition of six-foot auger extensions. Drills holes up to a horizontal depth of 120 feet. Finger tip control permits selection of any drilling speed up to six feet per minute and four individual self-locking jacks maintain correct drilling level during operation. Over-all length: 12 feet. Width: 5 feet, 8 inches.

VERTICAL DRILL

Here's a real time-saver for blast hole drilling of 6 and 8-inch holes practically designed for truck, half-track or caterpillar tractor mounting. The eight-foot tower is raised and lowered by hydraulic power and, when in traveling position, its over-all height is only seven feet, four inches. The auger is driven by an alloy shaft connected by a flexible chain coupling. The upper shaft section is 2½ inches square and drives through a lubricated sleeve located on top of the tower. Total weight: 4800 pounds.

COAL RECOVERY DRILL

This machine is specifically built for recovering coal after further strip mining is unprofitable. A three-man crew can easily drill to depths of 100 feet or more. With 16, 20, 24, 28, 36 or 40-inch augers, a McCarthy Drill will produce from 60 to 150 tons of clean coal every eight hours for a total cost, including depreciation, of less than \$1.50 per ton! A special steel-gear reduction unit, running in oil on Timken Bearings, transmits power through the heavy-duty transmission. Four speeds forward, one reverse are provided and the carriage travels a distance of eight feet. Over-all dimensions: 6 feet by 14 feet long. Total weight: 4700 to 5000 pounds. See your McCarthy Dealer today or write us direct for information.

Six-cylinder gasoline engine standard on all drills. Diesel or electric power units can also be supplied.

Manufactured by

The SALEM TOOL Co.
763 S. ELLSWORTH AVE., SALEM, OHIO, U. S. A.

BRING DOWN OVERBURDEN DRILLING COSTS

SLASH your overburden drilling costs by changing over to large diameter (up to 12") blast holes—drilled easily and economically with Bucyrus-Erie 42-T drills. Bigger holes mean you can use fewer holes, spaced in a wider pattern. You'll actually need less total footage. Fewer holes mean you'll save time—and money—with fewer move-ups and set-ups.

Greater explosive capacity of bigger holes brings down more cubic yards of overburden with each blast. You get equal or better fragmentation with no increase in explosive used. You'll find the per shift output of your drilling crew will be substantially increased.

Long-wearing moving parts and durable construction throughout cut to a minimum the maintenance expenses on Bucyrus-Eries. These rigs are powered economically, too—conserving fuel and expenses with smooth running diesel

engines or electric motors.

For more yardage drilled, for lower drilling costs, put a Bucyrus-Erie 42-T to work on your overburden.

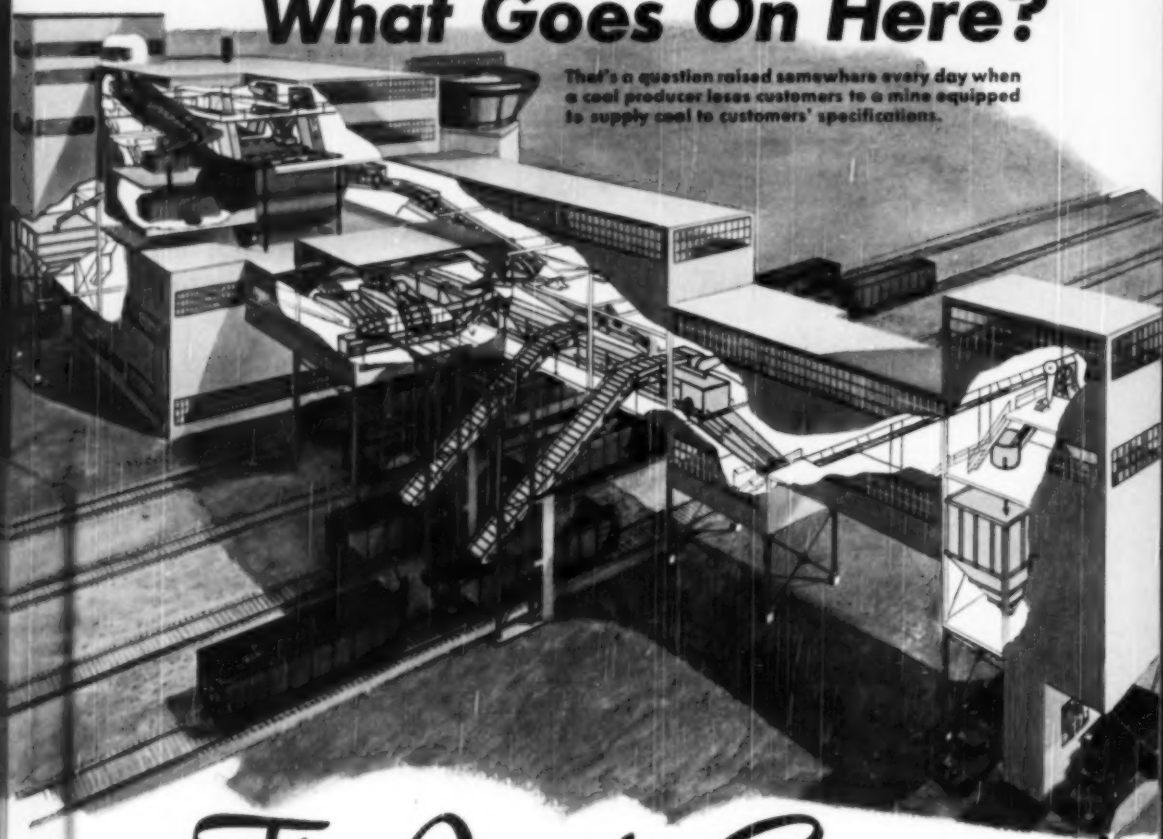
BUCYRUS-ERIE COMPANY
South Milwaukee, Wisconsin



BLAST HOLE DRILLS

What Goes On Here?

That's a question raised somewhere every day when a coal producer loses customers to a mine equipped to supply coal to customers' specifications.



The Inside Story

of how Coal becomes a **PREMIUM VALUE FUEL**

The mine superintendent usually comes across with the answer. "If we had a plant like this, we'd stop losing business. We could turn out more tonnage, give customers the specification fuel they're asking for." Yes... a preparation plant designed by McNally Pittsburg takes impurities out of coal automatically, upgrades it to premium fuel for only a few cents a ton. For example, take a look at these colored arrows. Each represents a step in processing that adds premium value to the coal in the plant that was designed specifically for the Crowe Coal Company, Clinton, Missouri.



The black arrow line shows raw coal entering the plant.



the refuse bin.

Gray arrow, refuse separated from coal in the washing circuit and conveyed to

Purple, middlings... stratified refuse before being crushed and rewashed.

Blue, washed coal, low in sulphur and ash, high in heat value.

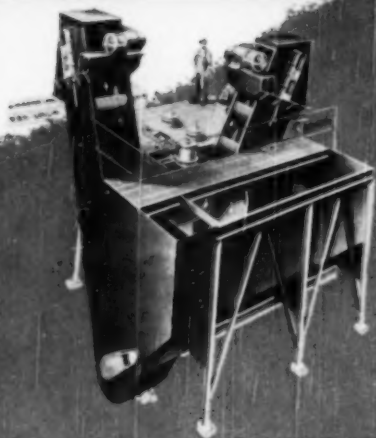
Red, the premium product, washed, classified, dewatered, ready for shipment to that waiting market.

The McNally Pittsburg technical staff will be glad to consult with you and recommend a plant that will enable you to produce fuel to keep your customers satisfied and to maintain your operation on a profitable basis.

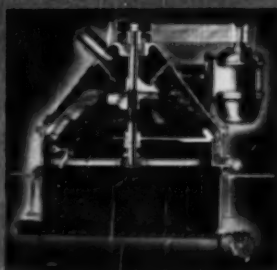
M'NALLY & PITTSBURG

MANUFACTURERS OF EQUIPMENT TO MAKE COAL A BETTER FUEL

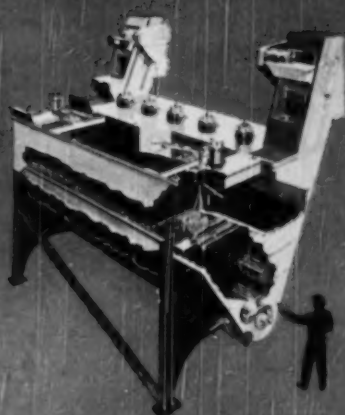
McNally Pittsburg Manufacturing Corporation—Manufacturing Plants: Pittsburg, Kansas • Wellston, Ohio
Engineering & Sales Offices: Pittsburgh • Chicago • Rio de Janeiro • Pittsburg, Kansas • Wellston, Ohio



◆ **McNALLY AUTOMATIC UNIT WASHER**—Handles coal from 5" to zero in tonnages from 20 to 90 tph.



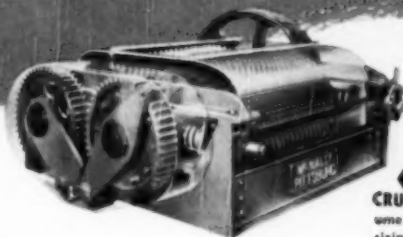
◆ **McNALLY-CARPENTER DRYER**—Low-cost centrifugal drying for fine coal sizes. Now available with new, improved cone assembly.



◆ **McNALLY-NORTON WASHER**—Clean-cut separation of coal from refuse. Fully automatic Saxon type. Models from 15-350 tph per unit.



◆ **SINGLE ROLL CRUSHER**—Wide selection of units for primary crushing, middlings re-crushing, or screenings production.



◆ **GEARMATIC DRIVE CRUSHER**—Offers high volume production, accurate sizing, minimum fines.

Units of Equipment

that go into **COAL PREPARATION PLANTS**
to produce **PREMIUM VALUE FUEL**

All McNally Pittsburg units operate with minimum attention, assure low-cost maintenance and low-power consumption. Crushing units, for example, are engineered to produce the greatest possible volume of wanted sizes

with the least volume of fines. Careful planning of washing circuits, selection of proper screening equipment for the job is but one service on coal preparation problems available to you on request.

STOKER COAL CRUSHERS

Available in three models and sizes as shown



36" x 48"
36" x 60"

24" x 24"
24" x 36"
24" x 48"

18" x 18"
18" x 24"

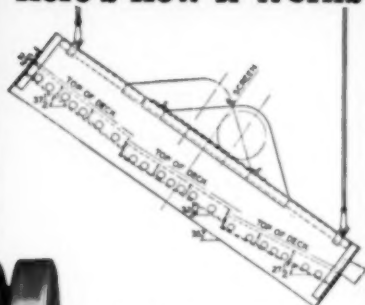
GET HIGH CAPACITY, ACCURATE SIZING

Handling Moist Coal

NEW
RIPL-FLO SCREEN
WITH "Tri-Slope"
DECK!



Here's How it Works



- ▶ The first section of the screen deck is sloped steeply for quick stratification, rapid conveying.
- ▶ The center section is set at less slope to slow down conveying rate.
- ▶ The discharge end section is set at a flatter angle than the second section to further reduce the rate of material travel.

The "Tri-Slope" deck can be used for screening moist coal in $\frac{1}{2} \times 0$, $\frac{3}{4} \times 0$ and 1×0 sizes containing up to 4% surface moisture. Available in 3 x 9, 4 x 9, 5 x 9 and 6 x 9 ft sizes. Single deck or single deck with conventional top deck. Send for Bulletin 25B6280B.

Ripl-Flo and Texrope are Allis-Chalmers trademarks.

Now—Allis-Chalmers offers you a vibrating screen with a new deck designed to control rate of material travel for more efficient screening of small size moist coal.

Ripl-Flo screens with new "Tri-Slope" deck feature a deck divided into three sections, each at a decreasing slope to provide a high rate of travel at feed end to reduce bed thickness and obtain rapid stratification... a retarded conveying rate on the second section... a further re-

duced rate at the discharge end as the bed becomes thinner, to pass marginal pieces through the screen.

"Sta-Kleen" deck construction makes it possible to screen coal with higher surface moisture than was previously considered practical... and get increased screening capacity.

Special shaped rubber balls bounce between the screen surface and a ball retaining deck located several inches below the screen cloth. These balls dislodge damp particles clinging to the screen cloth.

ALLIS-CHALMERS, 968A SO. 70 ST.
MILWAUKEE, WIS.

ALLIS-CHALMERS

A-3039

Sales Offices in
Principal Cities in
the U. S. A. Distributors
Throughout the World.



Motors



Controls



Texrope Drives



Vibrating Screens

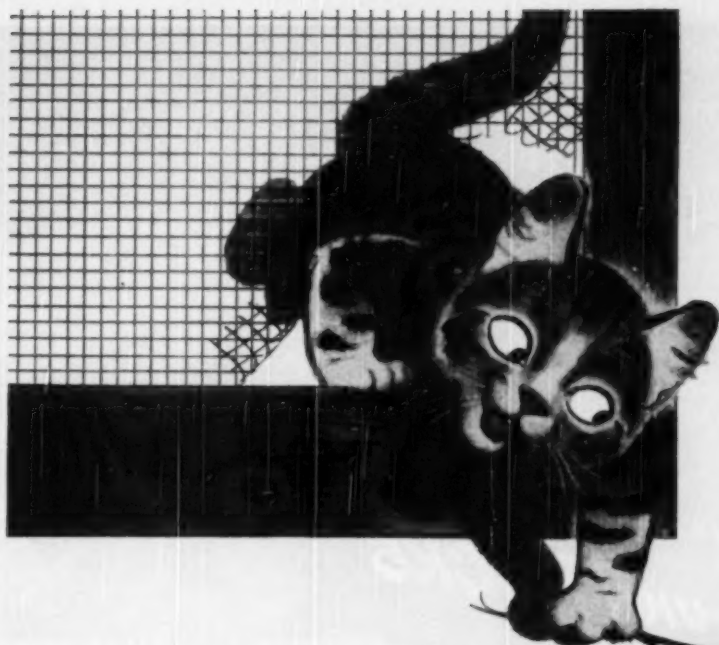


Crushers



Kilns, Coolers, Dryers





*PENETRATION

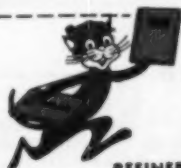
Peak production . . . without worry of breakdown due to friction and wear . . . is made easier with Tycol high quality greases.

Made to "absorb punishment" without thinning down and dripping, Tycol greases avoid wasted lubricant, lost bearings and unnecessary down-time. These ultra-safe lubricants keep bearings . . . gears . . . shafts . . . friction-free and cool. They are available in grades with the proper "*PENETRATION" needed to give power a chance to produce with a minimum of waste.

Call your nearest Tide Water Associated office. Let them suggest the Tycol grease best suited to your needs . . . and remember, Tycol green cast greases are made from high quality cylinder stock and well refined neutral oil, with a minimum of soap — a maximum of oil . . . more efficient lubrication per pound of grease.



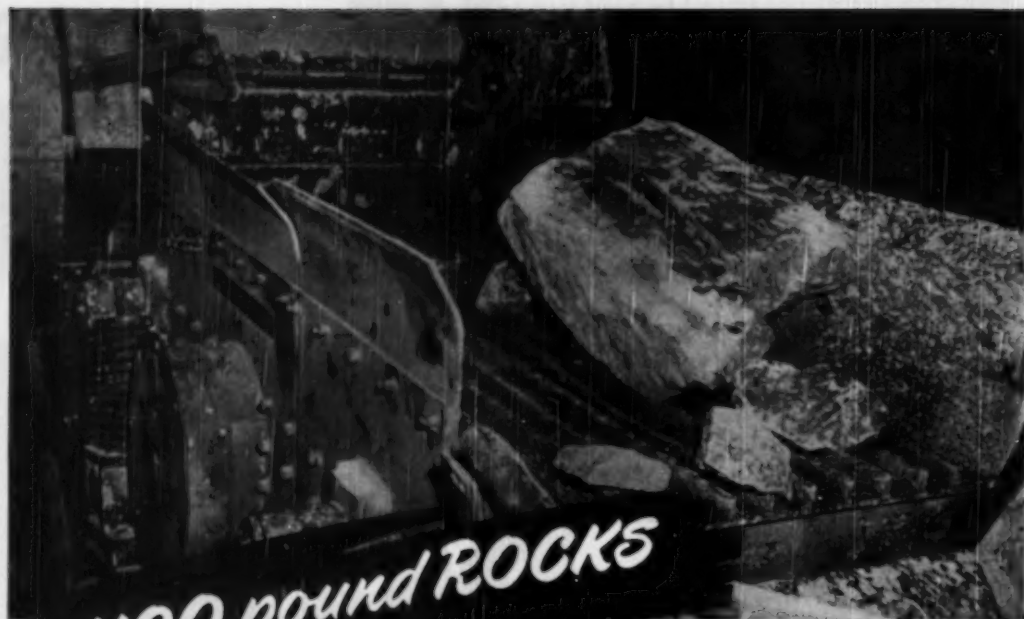
Boston • Charlotte, N. C. • Pitts-
burgh • Philadelphia • Chicago
Detroit • Tulsa • Cleveland
San Francisco • Toronto, Canada



*LEARN WHAT THIS PRODUCT CHARACTERISTIC MEANS TO YOU — READ "LUBRICANIA"
This informative handbook, "Tide Water Associated Lubricania," gives clear, concise descriptions of the basic tests used to determine important properties of oils and greases. For your free copy, write to Tide Water Associated Oil Company, 17 Battery Place, New York 4, N. Y.



REFINERS AND MARKETERS OF VEEDOL — THE WORLD'S MOST FAMOUS MOTOR OIL



1100 pound ROCKS
or tiny specks

... Hewitt-Robins Vibrating Screens Process Them All!

Take a look at that big brute of a machine. It's a vibrating screen—a Hewitt-Robins Heavy Duty Scalper.

The big rock you see on its deck is a 3' x 2' x 1½' lump of ore weighing about 1100 pounds. The Scalper handles loads like this at 1000 tons an hour. Yet, it absorbs those loads—and its own vibration—so completely that a coin placed on edge on the base beams will stand up without toppling over while the machine is running!

The same company that makes this big brute also makes a small

screen called a Ceramic Slip Lawn. This lawn is so precise in action, so effective in operation, that it finds and removes tiny specks of impurities—about ½ pound in every ton of material—from clay slip for pottery plants.

Think of that range—from 1100 lb. rocks to tiny specks! It's the best proof of all that Hewitt-Robins can satisfy your vibrating screen demands!

Just look at these facts: Hewitt-Robins originated the circle-throw principle for vibrating screens. Hewitt-Robins created the elliptical throw. Hewitt-Robins pio-

neered in both 4-bearing and 2-bearing vibrators. Hewitt-Robins introduced the full-floating principle of vibration-absorption.

Whatever you want in vibrating screen equipment, you can safely rely on Hewitt-Robins. Tell us your needs; we will supply the answer. Write to Robins Conveyors Division, 270 Passaic Ave., Passaic, N. J.

HEWITT-ROBINS
VIBRATING SCREENS

HEWITT-ROBINS  INCORPORATED

BELT CONVEYORS (belting and machinery) • BELT AND BUCKET ELEVATORS • CAR SHAKEOUTS • DEWATERIZERS • FEEDERS • FOAM RUBBER PRODUCTS • FOUNDRY SHAKEOUTS • INDUSTRIAL HOSE • MINE CONVEYORS • MOLDED RUBBER GOODS • RUBBERLOK ROTARY WIRE BRUSHES • SCREEN CLOTH • SKIP HOISTS • STACKERS • TRANSMISSION BELTING • VIBRATING CONVEYORS, FEEDERS AND SCREENS

HAZARD ARMORED SHAFT CABLE

Stands up longer

IN THIS TOUGH SERVICE

Shaft cable puts in a rough day's work. The speeding cage vibrates the shaft timbers and guides; sharp-edged, heavy chunks of coal and rock carom back down the shaft walls. Yet Hazard Armored Shaft Cable has been taking this daily punishment for years in many mines—and is still going strong without any failure.

It's a good example of Hazard's special cable engineering to meet the tough electrical jobs in mines. The photographs on this page show a typical Hazard shaft signal and communication cable installation. The 1400 ft. length of cable has 24 pairs of #14 Awg solid conductor insulated with tough, elastic and long-lived Hazard Watertite, a highly moisture-resistant rubber compound. Galvanized steel armor wire over-all assures lasting mechanical protection.

For shaft cable or any insulated wire or cable for mining use, it will pay you to talk to your Hazard representative. Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pa.

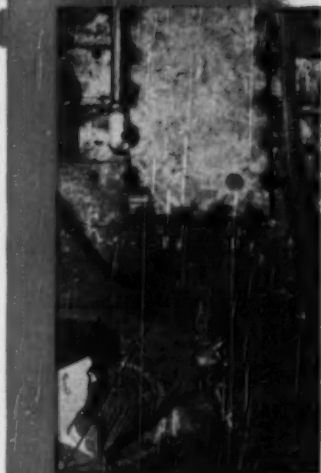


Cable suspended securely by individual steel armor wires at top of shaft.

Cable laminated in dust-tight junction boxes at both top and bottom of shaft.



Cable suspended at top hangs free in shaft with no clamping to timbers, thus permitting harmful moisture to run off without damage.



HAZARD

Insulated wires and cables for every mining use



*Get The Capacity.
Speed and Ruggedness You Need*

GOODMAN TRACTOR TREAD LOADERS

TYPE 660 . . . a low height, fast working, 8 to 10 ton per minute loader with a swinging head that cleans up an 18 foot path with only forward and backward maneuvering, loads around timbers and on curves. Upkeep expense has proved consistently low.



GOODMAN
MANUFACTURING
COMPANY

HALSTED STREET AT

IN TRACKLESS MINING

GOODMAN SHUTTLE CARS

TYPE 570 . . . a 48" high, cable reel car with a water level full capacity of 210 cubic feet. It has an adjustable height discharge conveyor, four wheel drive, four wheel steer, and four wheel brakes.



ATTENTION: *Users of Goodman Type 512 Shortwalls . . .*

Time and money saving advantages are being reported in every instance where Type 512 machines have been equipped with Bugduster units for automatic handling of cuttings. These units can be installed at the mine on any 512. Check now with your Goodman field representative.

48TH • CHICAGO 9, ILLINOIS



Why put up with Loose Frogs?



Four pairs of plates, each pair at a different tie position. Yet all eight plates are the same standard length, with the same punching.

**No need to! . . .
Bethlehem's Hook
Frog Plates anchor
the frog securely,
stiffen the track
at a vital point.**



Here's good medicine for loose frogs and bad alignment. It's the Bethlehem plate with the integral forged hook that fits snugly over the frog base to prevent lateral movement.

The plates are used in pairs, never alone. Each is drawn up until a tight fit results; then spikes are driven into the tie through the punched spike holes. The hooks of every pair oppose each other . . . hence equal, balanced holding forces keep the frog rigidly in place.

OTHER GOOD POINTS: These Bethlehem plates prevent cast frogs from cutting wood ties, thereby increasing tie life. They give a smoother bearing surface; raise the frog to the same height as the stock rails.

And finally—you can use the plates at several different tie positions. The one size is suitable for practically any frog used in mine track. There's no need to keep a large and confusing variety of plates, one size for every tie position.

Ask for more details—or better yet, let us demonstrate this helpful device. A Bethlehem man will be glad to give you the full story.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by
Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation



'Thar's
GOLD
in Slurry Hills!

The C-M-I centrifugal **DRYER** is the Efficient and Profitable method of recovering **SLURRY** and turning it into Black, Gleaming Nuggets of **SALABLE COAL!**

- **Here is Efficiency!** The C-M-I Dryer will reduce the water content of 28 tons of slurry from 82% to 7½% in less than one hour!
- **Here is Profit!** Figures submitted by operators using the C-M-I Dryer show that in slurry salvage alone, the extra profits will pay for the equipment in a few months time.
- **Here is Capacity!** The large C-M-I Dryer will handle over 75 tons of ¾" x 28 mesh coal per hour, reducing the water content from 25% of surface moisture to 6%.
- **Here is Durability!** All parts are fabricated from the best materials obtainable. Friction-free bearings and gears are assured of a cool, clean supply of oil at all times. Revolving parts are dynamically balanced on the latest type of balancing machine.
- **Here is Economy!** In many instances, the C-M-I Dryer eliminates costly heat drying altogether. In others, it reduces greatly the amount of heat drying normally required.

And it's all in the

C-M-I DRYER

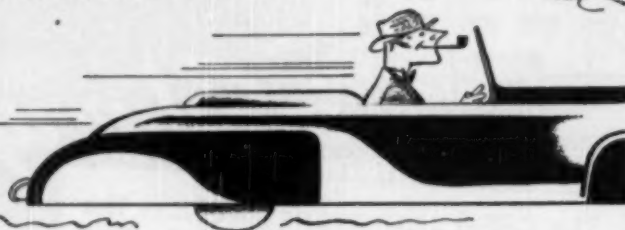
If you are interested in how your dewatering problem may be solved with a C-M-I Dryer, write to us, stating the material, its specific gravity, its sizing, such as the percentage on 8 mesh, 10 mesh, 20 mesh, 35 mesh, 65 mesh and 100 mesh standard Tyler screens, and also the amount passing through 100 mesh. A gallon sample of the material in the state it would be fed to the centrifugal would be helpful. We will size up your problem at no obligation to you.

CENTRIFUGAL and MECHANICAL INDUSTRIES, Inc.
 146 PRESIDENT STREET ST. LOUIS 18, MO.

Yesterday--
JERK ! BANG!

Today--
Smooth--Quiet

Compare the Old
"One-Lunger" with the
Power of the Modern Motor



...SO **ROCKMASTER "16"** compares with old blasting methods

In the ROCKMASTER "16" Blasting System, pioneered by Atlas, sixteen milli-second delay electric detonators, all starting together, fire at controlled split-second intervals over a period of only a little over a half-second.

Talk to any experienced blaster who has compared ROCKMASTER split-second blasting methods with ordinary instantaneous or delay-action blasting. He'll tell you why it's like comparing a modern multi-cylinder automobile with an old-time one- or two-cylinder model! ROCKMASTER blasting gives a smooth flow of blasting power that means control over throw and breakage never before possible—with far less noise and vibration!

Your job may call for two, three, or even all sixteen ROCKMASTER detonators. We help you select them to fit a particular job in quarry, strip pit, mine, construction . . . on the surface or underground. Drill pattern is adjusted to fit the system, often with substantial savings in drilling and dynamite.

Write for your copy of booklet on the ROCKMASTER "16" Blasting System. It includes diagrams for typical loading in quarries, strip pits, mines and many types of construction.

Less Bark More Bite



ROCKMASTER "16" TIMINGS

Rockmaster No.	Avg. Time of Each Delay from Zero (milli-seconds)
0 (zero)	0 (inst.)
1	8
2	25
3	50
4	75
5	100
6	125
7	150
8	175
9	200
10	250
11	300
12	350
13	400
14	450
15	500
16	550

ROCKMASTER: Reg. U. S. Pat. Off.

ATLAS

EXPLOSIVES

"Everything for Blasting"



ATLAS POWDER COMPANY, Wilmington 99, Del. • Offices in principal cities • Cable Address—Atpowco

Extra Thousands of Trouble-Free Payload Miles with **EATON** *2-Speed Truck* **AXLES**



*More Than a Million
Eaton 2-Speed Axles
in Trucks Today*

Even at slowest truck speeds—where gear tooth loads are often highest—Eaton's exclusive Forced-Flow Lubrication System provides positive protection for vital axle parts. With less than one revolution of the axle drive gear, oil begins to flow to all moving axle parts. As speed increases, flow is accelerated to meet the demand. This means reduced friction and wear, longer axle life and lower upkeep cost. Eaton 2-Speed Axles are available for most trucks of the 1½-ton class and larger. Ask your truck dealer for a road demonstration.



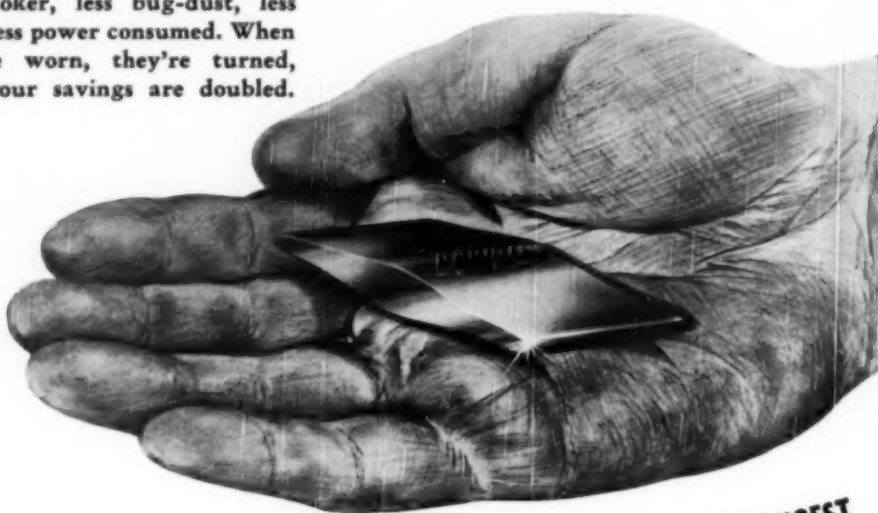
Axle Division
EATON MANUFACTURING COMPANY
CLEVELAND, OHIO



PRODUCTS: SODIUM COOLED, POPPET, AND FREE VALVES • TAPPETS • HYDRAULIC VALVE LIFTERS • VALVE SEAT INSERTS • JET ENGINE PARTS • ROTOR PUMPS • MOTOR TRUCK AXLES • PERMANENT MOLD GRAY IRON CASTINGS • HEATER-DEFOSTER UNITS • SNAP RINGS • SPRINGTITES • SPRING WASHERS • COLD DRAWN STEEL • STAMPINGS • LEAF AND COIL SPRINGS • DYNAMATIC DRIVES, BRAKES, DYNAMOMETERS

● Bowdil's Patented **CONCAVE CUTTER BITS** are designed to stay sharp as they wear down. *Sharp bits that stay sharp*, of course, mean easier cutting, faster cutting, therefore more cuttings, more coarse cuttings, more profitable stoker, less bug-dust, less drag, less power consumed. When they're worn, they're turned, and your savings are doubled.

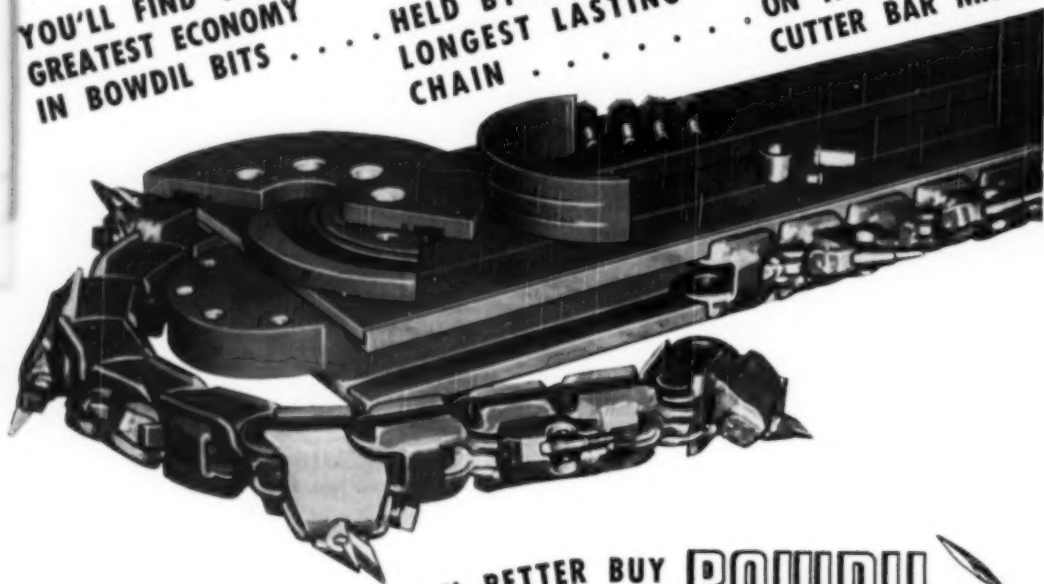
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2,217,347



YOU'LL FIND YOUR
GREATEST ECONOMY
IN BOWDIL BITS

HELD BY THE
LONGEST LASTING
CHAIN

ON THE STRONGEST
CUTTER BAR MADE



FOR LOWEST COST PER TON BETTER BUY

BOWDIL

COAL CUTTING EQUIPMENT
CANTON OHIO

Only Cities Service Offers the Mining Field



1. LUBRICATION SERVICE—the services of an able lubrication engineer available at no cost. This man is thoroughly experienced in the lubrication requirements of every type of mine operation.



2. INDUSTRIAL HEAT PROVER SERVICE—This combustion analysis service detects inefficiency in steam generating units, 4 cycle Diesel engines and other fuel consuming units. A demonstration analysis is free.

All These Extras...at No Extra Cost!



3. COMPLETE QUALITY LINE—Coal mining machinery greases, Diesel oils, gear oils, hydraulic oils, pneumatic tool oils, cable dressings, compressor oils, motor oils and other fine petroleum products for the industry.



4. FREE LUBRICATION INFORMATION—A new booklet entitled "Coal Mining Machinery Lubrication" is available free. (See coupon below.) Also a wealth of other lubrication literature is available upon request.



CITIES SERVICE OIL COMPANY
Sixty Wall Tower, Room 609, New York 5, New York
Please send me without obligation:
Free ☐ "Coal Mining Machinery Lubrication" booklet,
☐ Lubrication Service Information, ☐ Heat Prover Service Information.

Name _____
Company _____
Address _____
City _____ State _____



**Used This Way—
Three Five-Dollar Bills A Day
Can Produce
Tremendous Savings**

**You Can Put \$50,000 in S-D 1-2-3 "Automatics"
From the Savings of Only 8 Man-hours a Day . . .**

Change-overs to the S-D 1-2-3 "Automatic" System of mining has, in dozens of cases, changed coal mines from deep in the red losses to black profits. The S-D "Automatic" System of haulage was never so necessary to profitable mining as it is today.

When an operator tells us—"I've got to reduce my production costs \$1.00 per ton"—and when he did it by changing over to the S-D 1-2-3 "Automatic" System of transportation, it's time we were getting down to the fundamentals of capital investment vs. man-hour costs.

Study this simple and basic analysis of Capital Investment vs. Man-hour Cost. Then do a little figuring on your own of what actual reduction of costs would be.

- 1—\$15.00 a day saved, 266 days a year, equals \$4,000.00 annual savings in direct cost.
- 2—This \$4,000 annually will pay for \$50,000 in S-D "Automatics" over 20 years as follows:
 $\$2,500$ per year for depreciation.
 $\$1,500$ per year for 6% interest on average outstanding balance of \$25,000.
- 3—Therefore \$15.00 savings per day pays for \$50,000 worth of mine cars, and \$50,000 will buy 75 to 100 S-D 1-2-3 "Automatics."



These figures, of course, are only basic. Actual change-over installations (changes from obsolete, worn out cars to modern S-D 1-2-3 "Automatics") always prove savings that will multiply these basic figures many times. For Example: Ten times this basic saving would be conservative . . . result—cars would be paid for in less than 18 months. Sanford-Day Iron Works, Knoxville, Tenn.

SANFORD-DAY IRON WORKS
KNOXVILLE TENNESSEE



PAYLOADERS *on rubber*

for Traction + Speed + Mobility

The Model HM Payloader is a new kind of profit-maker for both open pit and underground mines . . . a new kind of tractor-shovel whose large pneumatic tires and 4-wheel drive provide digging power and ground-gripping traction to go places and do things over any kind of ground. It will operate on coal veins without chopping and grinding the coal. It will dig, load, grade, carry, lift and push.

The 1½ cu. yd. bucket has full double-acting hydraulic power control and can be replaced quickly by a bulldozer blade, crane hook or lift fork attachment. There are four speeds in each direction, power-booster steering, fullest operator visibility and comfort, powerful hydraulic brakes, and other outstanding features. Your Hough PAYLOADER Distributor has full facts on the Model HM . . . see him today or write to The Frank G. Hough Co., 735 Sunnyside Avenue, Libertyville, Illinois.

**CLEAN TOPS
OF VEINS
FEED STRIPPING
SHOVELS
LOAD TRUCKS
MAINTAIN ROADS
MOVE TOOLS
AND SUPPLIES
LIFT • PUSH • CARRY**

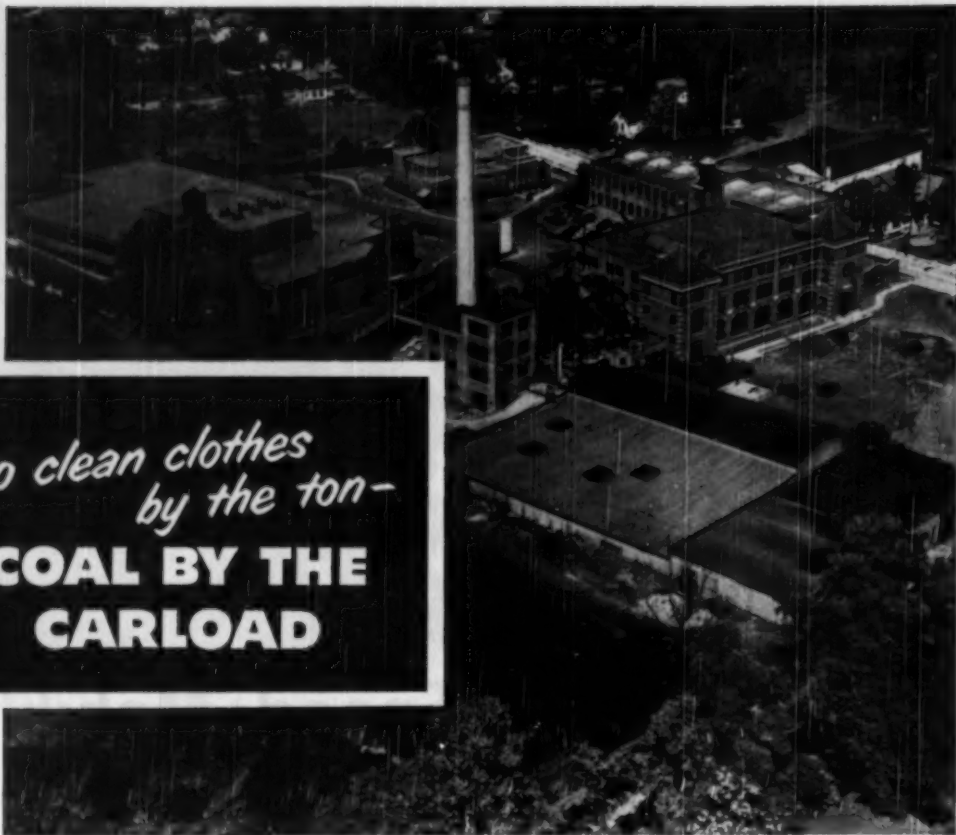
Send for literature on the Model HM 1½ yd. or any other size Payloader; the 1¼ yd. Model HL; the ¾ yd. Model HF; the ½ yd. Model HE; the 12 cu. ft. Model HA.



HOUGH PAYLOADER.

Manufactured by THE FRANK G. HOUGH CO.





*to clean clothes
by the ton—*
**COAL BY THE
CARLOAD**

Plant of the Little Falls Laundry Company, Little Falls, N. J. Photographed by William Vandivert

If your family wash added up to millions of pieces, you'd keep a close watch on the expense of providing hot water and steam. And that's just what the laundry shown above does—because it's one of the biggest laundries in the world.

This laundry uses 50,000 pounds of steam every hour, requires a half-million gallons of hot water every day, and manufactures all the electricity for its machines, dryers, and ironing equipment. It burns coal, of course—more than 150 tons every week—to provide all this heat and energy *at the lowest possible cost.*

To give industrial coal users everywhere a steadily better product, coal operators will continue to invest millions of dollars every year in mine improvements. Older mines are being modernized. New mines are designed to utilize revolutionary new high-production machinery. Washed, graded and treated in huge surface preparation plants, such coal burns with top efficiency. It provides more heat, creates more steam, and furnishes more power per ton.

Because America's progressive bituminous industry continues to pioneer in new mining and coal-preparation methods, coal continues to be America's *foremost industrial fuel!*

Today's most progressive coal mines are like vast modern factories underground, where mechanization has all but banned the pick and shovel. Cutting and loading and transporting are performed by highly efficient, specially designed machines. More and more, today's miner is becoming a skilled machine operator—and his average hourly pay is higher than that of workmen in any other major U. S. industry.

BITUMINOUS COAL

BITUMINOUS COAL INSTITUTE

A DEPARTMENT OF NATIONAL COAL ASSOCIATION

WASHINGTON, D. C.

BITUMINOUS COAL . . . LIGHTS THE WAY . . . FUELS THE FIRES . . . POWERS THE PROGRESS OF AMERICA

Rome 60 MINING CABLES



APPRO. NO. F-105 BM
means full compliance
with Federal and State
Safety Codes



First BY CHOICE!

Take a good look at this Rome 60 Flat-Twin (Parallel Duplex) Mining Machine Cable. See how the grounding conductor is separated from the insulated conductors by a Neoprene web . . . in fact, it is embedded solidly in molded Neoprene, same all-resistant material as the long-wearing sheath.

Check these definite advantages:

Maximum Flexibility . . . greater elasticity due to the complete absence of restraining fibrous "separators."

Non-Setting . . . as compared with fibrous components, the Neoprene web will not rot or deteriorate.

Increased Protection Against "Shorts" . . . high quality rubber compound, combined with Neoprene for unbeatable insulation.

Higher Impact Resistance . . . because of the shock absorbing resiliency of Neoprene compared with harder fibrous materials.

Add to these: Rome's long aging, moisture and heat-resistant rubber insulation permitting continuous operation at temperatures up to 75°C. thereby, providing higher rated current carrying capacities and greater over-load protection.

A tough Neoprene sheath vulcanized in continuous lead molds for maximum durability, plus resistance to oils, acids, abrasion and flame . . . Yes, in Rome 60 you have a mine cable that's hard to beat. Specify it on your next mine cable purchase.

It Costs Less to Buy the Best...

Buy Rome Cable

- ★ Maximum flexibility
- ★ Adequate grounding
- ★ Flame resistance

Standardize on these Rome Mining Cables:

Rome 60 Type SO Portable Cords

Rome 60 Locomotive Cable

Rome 60 Concentric Mining Cable

Rome 60 Flat-Twin (Parallel Duplex) Mining Cable—Types W and G

Rome 60 Portable Power Cables

Type W—Up to 3000 Volts

Rome 60 Portable Power Cables

Type G—Up to 5000 Volts

Mine Power Distribution Cable

Shot Firing Cord

Mine Telephone Wire



OVER 30 YEARS EXPERIENCE
BUILT into Steel Grid Resistors
designed by **POST-GLOVER**

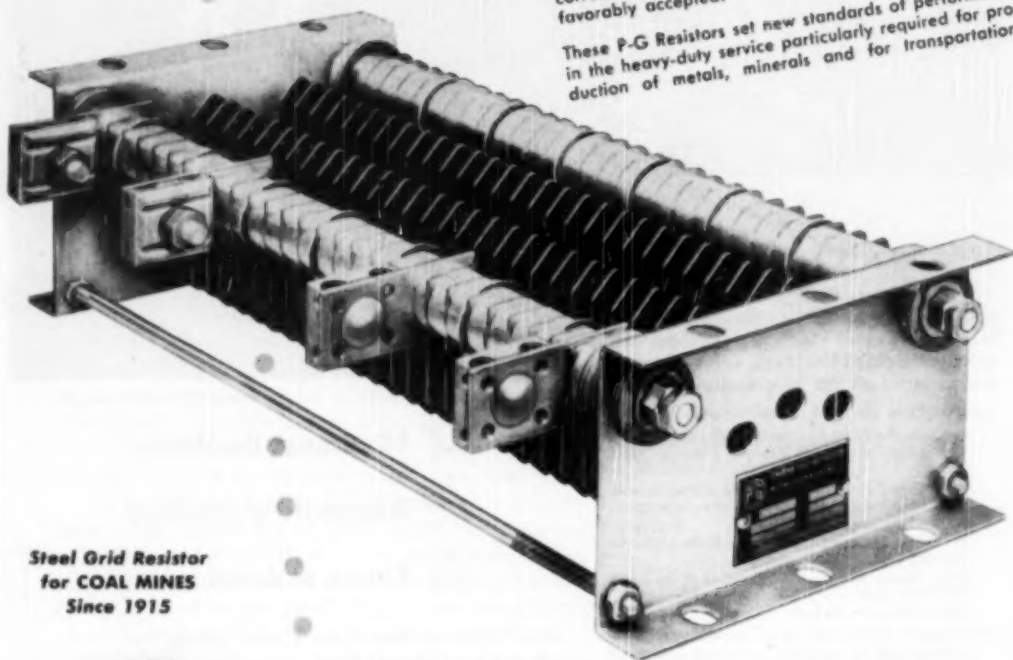
More than thirty years ago, to meet a demand for resistors capable of longer, trouble-free service, Post-Glover introduced a "Steel Grid Resistor."

These original "nonbreakable" resistors met instant favor, since they operated continuously under such adverse conditions as the dust, moisture and vibration of coal mining service.

From the experience thus accumulating through years of intimate association with actual heavy-duty operating conditions, the present P-G Type T2 Steel Grid Resistor was developed.

The all-steel construction, mica insulation, provision for expansion as well as resistance to moisture and corrosion of Type T2 continues more than ever to be favorably accepted.

These P-G Resistors set new standards of performance in the heavy-duty service particularly required for production of metals, minerals and for transportation.



Steel Grid Resistor
for COAL MINES
Since 1915



SPECIFY P-G FOR YOUR NEXT APPLICATION

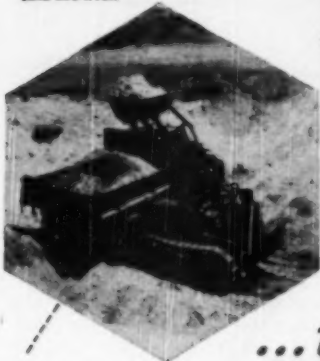
The Nonbreakable Steel Grid Resistor

THE POST-GLOVER ELECTRIC COMPANY

ESTABLISHED 1890

221 WEST THIRD STREET, CINCINNATI 2, OHIO

OLIVER HG Crawler Tractor with Ware Loader loading sand into truck.



OLIVER HG Crawler Tractor with Ware backfiller blade attached to shovel arms.



OLIVER Model "88" Wheel Tractor with Ware boom handling cast iron pipe.

...take the "Load" out of Your Loading Problems!

Whatever your loading problem, the easy, economical answer is an Oliver Crawler Tractor or Oliver Industrial Wheel Tractor and Ware Front-End Loader.

These powerful tractors and the hydraulically operated loaders are easy to operate . . . easy on maintenance and operating costs. Lift and bucket are hydraulically controlled. Hydraulic control of bucket assures greater breaking-out action and full loads . . . prevents wasteful spillage. "Midsection" pivot allows longer reach of dumping position and distributes the weight advantageously over the tractor frame to minimize strain. The hydraulic rams are designed to take most of the shock loads, assuring longer life for both tractor and loader.

And, the tractor-loader unit can be quickly converted to backfiller, boom or lifting fork. Special buckets are available for coal, snow or humus loading. The hydraulic system can be used to power other equipment such as mowers, sweepers, etc., in combination with the loader. For all the facts, see your local Oliver Industrial Distributor, or write direct to:



OLIVER Model "88" Wheel Tractor and Ware Loader loading out gravel.



OLIVER HG Crawler Tractor with Ware Loader on ditching job.

THE OLIVER CORPORATION

Industrial Division: 19300 Euclid Avenue, Cleveland 17, Ohio

A complete line of Industrial Wheel and Crawler Tractors



"THE SIGN OF EXTRA SERVICE"



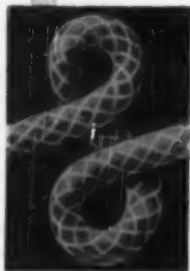
**Switch
to this new**

**PLASTIC Reinforced
PRIMACORD
in place of Wire Countered.**

Field tested for over a year — where the going is toughest — the new PLASTIC Reinforced Primacord showed itself far superior to Wire Countered Primacord. Yet it costs no more!

Reinforced with rayon yarn, it is stronger and lighter in weight. Finished with a smooth, tough seamless plastic covering, it is waterproof and resistant to acids encountered in mineral ores. It does not become brittle or crack in cold weather, nor is it affected on hot summer days, and it is not a conductor of electricity.

PLASTIC-Reinforced Primacord is your best bet in all deep, wet holes — in preloading, pipe line river crossings, horizontal holes, marine work, coyote tunnels and sleeper shots for seismograph work.

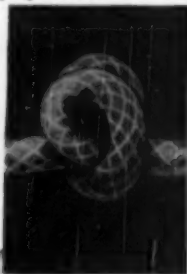


Plastic Reinforced Primacord is recommended for "down" lines where you formerly used Wire Countered Primacord.

1. To make the most effective hookup, use a simple clove hitch in the ground line, as shown in these three photographs.



3. Pass the Plastic Reinforced Primacord through this hole and draw the knot up tight.



2. The twin loops have been folded over to form a hole.

THE ENSIGN BICKFORD COMPANY • SIMSBURY, CONN.

PRIMACORD-BICKFORD DETONATING FUSE • SAFETY FUSE SINCE 1836

P-1

JUNE, 1930

IVAN A. GIVEN, EDITOR

In the Right

IT IS STILL TOO EARLY to state definitely that coal will win its fight against the unfair competition of foreign oil—particularly in the industrial market and particularly along the Atlantic Coast. But indications were that it was making progress and had reason to hope that if it kept the pressure on it would attain real results. The industry deserves to get results, since the question is vital not only to its own welfare but, even more important, to the welfare of the Nation.

If coal is driven out of a substantial portion of the industrial market by heavy fuel oil deliberately sold below cost while the difference is loaded onto the general public through increased gasoline prices, the result, though it may not be immediate, is inevitable: liquidation of a significant portion of the coal-producing capacity of the country—

and perhaps oil-producing capacity also. One consequence would be elimination of all brakes on future increases in the price of fuel oil. Even more important, the country would be placed in a position of depending upon an ocean supply line—and on foreign producing and refining facilities—for a major portion of its fuel needs. If that foreign supply should be interrupted by war or other emergency, the United States, without sufficient coal- or oil-producing capacity actually in existence would be in a bad way indeed.

The coal industry, therefore, was never more right in insisting on action to limit the influx of foreign oil. The fight it is putting up is further evidence of how far coal has progressed in staging effective drives to achieve goals it believes in. Success will mark another step forward in strengthening the industry's ability to meet and solve its problems. There is every reason, therefore—from both the national and industry standpoints—for keeping up the pressure.

Critical Factor

HOW FAR can the deep mine go in increasing tons per man—the vital ingredient in cost? Recent study of the factors involved definitely indicates that a critical one is service labor, meaning all labor—preparation, maintenance, haulage, supervision, clerical and so on—from the time the coal leaves the working section and starts for the outside. Deep mining, among other things, requires more service labor than stripping, which is one reason why stripping has and will maintain for some time its cost advantage. One conclusion, therefore, is that stripping should be called upon to supplement deep mining wherever and to the maximum extent possible for the best over-all cost.

Why is efficiency in service so important in deep mining—and in strip mining, too, for that matter? Assume that for 1,000 tons of daily output, a deep

mine is employing 84 men for service. Then, tons per man-day in service labor is 11.9. Now, assume that face work is highly efficient, meaning, for example, that two crews totalling 30 men get out 1,000 tons per shift. With 114 total men, the over-all tons per man is only 8.8 in spite of high efficiency at the face. If 60 men were required at the face, over-all tons per man would drop to 6.9.

Now, if tons per man for service labor was 20, meaning that 50 men were required per 1,000 tons and that service efficiency was high, over-all productivity would be as follows: with 30 facemen, 12.5 tons per man; 60 facemen, 9.1 tons per man. Thus, while it is vitally important to raise tons per man at the face, it is equally vital to back up the facemen with an efficient, mechanized service system to insure maximum cost reduction. And since service labor is approximately the same regardless of coal thickness, the job becomes even more important to thin-coal operations, where it is more difficult to get high tons per man at the face.



Wide World Photo

FRIENDLY MINERS are the primary need in coal's new plan for shaping . . .

Grassroots Public Opinion

A Plan You Can Use to . . .

- Find Out Where Your Company Stands
- Win the Friendship of Your Workers
- Gain the Good Will of Outsiders
- Help Your Company and the Coal Industry

YOU'VE GOT PUBLIC RELATIONS whether you like it or not.

If your public relations are good—that is, if people think well of you and your company—you've got a good chance of prospering in flush times and staying in business when the cycle turns down. If your public relations are bad, you've got two strikes against you whichever way business turns.

Your public relations are your dealings with people—the people who answer the phone when you call, buy your products, sell you their goods, live close to you or work near you. Your public relations include also the people who compete with you, those who walk or drive past your mine or your office and those who read your advertising. And your public relations include the people who work for you.

What these people think adds up to public opinion of you and your company. Add what they think about you and your company to what millions of other people think about other companies and you come up with public opinion of the whole coal industry.

That's why each person you deal with is important. He is an individual, swayed by impressions, quick to jump at conclusions and easily made a friend or foe. When he orders a car of coal from you, sells you a spool of cable, gets a letter or invoice from you, stops and talks to you on the street or gets his pay at your payroll office, you have a chance to shape his opinion to your advantage or disadvantage.

Maybe he knows the facts about your company and your industry and therefore is friendly. Maybe

he's misinformed and therefore is unfriendly. Maybe he's just neutral. Whatever class he falls into, the kind of treatment you give him fixes his feelings about you personally, your company and the people who work with you, your product and service, and your industry and the companies that make it up. In short, each contact you and your company make gives public opinion a shove one way or the other and becomes, accordingly, a help or a hindrance in public relations. Public opinion isn't far away. It's right on your own front doorstep and in your own back yard. Your miners play as big a role in it as the man who burns your coal.

So, if you want to improve public opinion of yourself, your company and the coal industry and thus make it easier for you to sell coal, and if you want to ease yourself over some rough labor-relations bumps and win supporters for yourself and coal in issues you are a party to, you can start hustling. To help you along, here is a five-stage program:

1. Find out the facts.
2. Clean up the bad spots.
3. Enlist your allies.
4. Pick your targets.
5. Coordinate your tactics.



Stage 1—Find Out the Facts About . . .

Helping Your Town

Dealing With Workers

Improving Your Mine

Upping Product Quality

HAVE YOU APPRAISED yourself and your company recently to find out your public-relations assets and liabilities?

If you haven't, you might be surprised at some of the things you'll find out. You might discover, for instance, that the facts that were true 10 years ago or last year really aren't facts any more, but just opinion. You might find also that some of the facts you accept as assets look like liabilities to an outsider.

The first step, then, is to find out the facts about yourself and your company. Some of them doubtless are good. If they weren't, you probably wouldn't have stayed in business as long as you have. For instance, your payrolls probably account for a big share of your community's prosperity. Your tax bill helps support schools and health services and build streets. Maybe some of the supplies you buy keep local merchants in business. Maybe you or some of your men give a lot of time to community-chest drives or the local school board. If your miners are well housed, if you provide opportunity for regular work, if your mines are as safe as you can make them, if you send a high-quality product to market, if your local union works along with you in safety drives and community affairs—if these things are true, or if any one of them is true, you've got a starting point for shaping public opinion favorably.

But would you think as well of your company and yourself if you were an outsider? For a moment, forget you're a coal man and ask yourself some questions.

For instance, do you and your company shy away from community projects? Is there anything in your record as a business man and citizen that suggests that you're a moss-backed standpatter, out of step with industrial progress and unwilling to share your company's gains with the men who work for you and the town where you do business? Do you spend a lot of time in fruitless wrangling with your mine committee over griev-

ances that ought to be simple gripes? Have you failed to buy new equipment that would make your mines safer and your men's work more comfortable? Do your miners live in tumbledown houses? Is the local school a firetrap? Has



Stage 2—Clean Up the Bad Spots in . . .

Civic Relations

Labor Relations

Supervisors' Attitudes

Working Conditions

IF YOU FIND SOME BAD SPOTS, what do you do then?

As explained above, you can't hide them. You might for a while, but not for long. On the other hand, you don't have to advertise them. But you'd better clean them up before they begin to advertise themselves.

If you find out that the facts—or any of them—are bad, do all you can as fast as you can to change them. Shake up your organization.

Start up some training courses. Smooth out your labor relations. Brush up your customer relations. Modernize your mines and plants. Start up some community improvements.

If you want your workers, your customers, your neighbors and the rest of the public to think well of you, you've got to put your house in order. Clean out the cellar and the closets and sweep the trash away. That'll give you a good start.



Stage 3—Enlist Your Allies Among . . .

Your Supervisors

Your Miners

Your Office Workers

Your Stockholders

YOU NEED HELP to win public opinion over to your side.

Your strongest allies are the people who have a real stake in the company—your directors and stockholders; your superintendents, foremen and miners; and your salesmen, receptionists, telephone operators, company-store managers

and clerks. Like you, they get along better when the company thrives. That's why it's easy for you to make them willing and helpful allies.

These people already know—or should know—the facts about the company and their relation to it. If they don't, you've got a job of in-

Can You Answer "Yes" to These Public-Relations Questions?

If you can, you have laid a foundation for public goodwill for your own company and the coal industry.

1. Would you think well of your company if you were an outsider?
2. Do you and your company accept a fair share of community responsibilities?
3. Do you keep your mine modern, buying new equipment to speed production and make mining safer?
4. Do you have fewer disputes with your miners than you had a year ago? Five years ago?
5. Is your company's safety record better than it was a year ago? Five years ago?
6. Do your employees, your neighbors and your customers know the facts about your company?
7. Do you make it easy for your workers to ask you questions and air their troubles?
8. Do you get inside the mine often to talk to your miners and your supervisors?
9. Do you encourage a lively exchange of information among the various departments of your company?
10. Do you often invite your directors and stockholders to spend a day at the mine with you?
11. Have you established a close, friendly relationship between yourself and your workers in your mine and your office?
12. Do you consider the civic leaders in your town important to your public relations program?
13. Do you ever invite local groups—school teachers, civic clubs, preachers—to visit your mine?
14. Have you won the confidence and respect of the editor of your local newspaper?
15. Do you often stop on the street downtown and talk leisurely with townspeople?
16. Do you accept invitations to make speeches to Kiwanis, Lions and other clubs in your town?
17. Do you tell your customers and suppliers how you feel about current issues and problems?
18. Do your customers and neighbors get copies of your company magazine?
19. Do you express your views freely and often to the men who represent you in Congress?
20. Do you gear your public-relations program to the national programs of coal and other industries?

side public relations to do among your own people. If you bring them around, they'll help you work on the people whose interest in the company is more remote than their own.

What should these people, your strongest allies, know about you and the company? Among other things, they ought to know the following:

How much coal the company mines.

Who buys the coal and what it's used for.

What the company's selling problems are.

How and where competition hurts.

How many people work for the company.

How big the weekly, monthly and annual payrolls are.

How the sales-income dollar is divided up.

How much the company pays to welfare funds, workmen's compen-

sation and benefits for salaried employees.

Whether the company's profit is big enough to keep the business going.

Where and why the company buys new machines, what they do and how much they cost.

What each department does and how the whole operation is geared together.

What the company contributes to civic enterprises and improvements.

What the company's safety record is and how it measures up to others.

If your people know these facts and others like them, you'll have an easier job persuading them that when they're working for the company, they're really working for themselves. And if they realize this and know the facts, they'll spread your strong inside public relations quickly and effectively among outsiders.

But suppose your people don't know these things about the company. How can you put the facts across to them?

To begin with, the most important channel for sharing information among your people is yourself. The big role in inside public relations is yours—creating a friendly, understanding relationship with the people who work for you and with you.

To see where you stand and what you ought to do along these lines, ask yourself a few questions, like the following:

1. When did you last turn up at the mine mouth in time to exchange a few words with your miners just before they went inside? Did you make it easy for them to ask questions and unload troubles?

2. Have you been inside the mine recently and given the men at the face a chance to talk to you?

3. Did you stop in at the mine

office yesterday or last week or last month to swap ideas with your mine foreman or your section foremen?

4. Have you ever escorted a couple of miners through your sales office to show them what goes on there?

5. How long ago was it when you showed one of your salesmen around the cleaning plant and put him in touch with the tippie foreman?

6. Do you and your store manager ever go underground together? Or drop in at a miner's home while his wife gets supper?

7. When was the last time you sat in the bleachers with some of your miners at a ball game?

8. Do you ever invite a couple of stockholders or directors to drive out to the mine and spend a day looking around and talking?

Those questions could go on and on. But you've got the point by this time. Your own public relations and those of the company start with the people who work with you and for you. If you want them to feel good about the company and learn more about it, you've got to take the lead personally.

Naturally, that's not all you can do. For instance, you can write a letter periodically to your workers and associates telling them how the company is getting along, what its outlook is, who has made some special contribution to the company's good or how the company showed up in a community-chest or Red Cross drive or a safety contest. Make it a friendly-sounding letter and say what you want to say in simple, straightforward language.

If your company publishes a magazine or newspaper, you can write a short piece for each issue telling the readers some of the things you are thinking about, worrying over or planning to do. If you keep your approach friendly and informative, the chances are they'll go along with you.

One of the secrets of clearing communication channels between yourself and other people is to give them the impression that you want to be friendly and have leisure to talk and answer questions. That attitude encourages a man to open up to you. When he opens up, he'll soon reveal the things he's puzzled, misinformed or uninformed about. That's just what you've been waiting for. It's your chance to move in on him, set him straight and thus enlist another ally.



Stage 4—Pick Targets, Including . . .

Your Townspeople

Your Business Friends

Your Civic Leaders

Your Legislators

YOUR PUBLIC-RELATIONS TARGETS, once you've made allies of the people who work with you and for you, are the people and groups outside your company—the people who live in the town where the mine is; the children who will grow up to be your workers; your customers and neighbors; the local churches, civic clubs, women's groups and town officials; the teachers, preachers, doctors, newsmen and radio people in the town; and your suppliers and competitors. Your aim is to deserve and earn the respect and goodwill of all of them. That means, after you've put your house in order and lined up your allies, finding ways to spread the facts around.

If you've prepared them right, your own people will do a big part of the job themselves. Just by being well informed and fond of their company and their jobs, they'll represent you favorably wherever they go among their friends and acquaintances. They're about the best public-relations helps you can have.

But you and your company can do other things to spread the facts around and win goodwill. For instance, have you ever thought of inviting any local group—school teachers, high-school boys and girls, the ministerial association, the Rotary Club or the town council and mayor—to spend a few hours at your mine?

This idea has worked out pretty well in places where it has been tried. Last October, for example, in New Britain, Conn., eight major industrial concerns joined together in a Business-Industry-Education Day. Going along with the plan, the school board closed down schools for the day, thus freeing about 500 teachers for visits to the plants. The teachers split up into small groups. Each group was picked up by an automobile and driven to the plant it elected to visit. The president of each company welcomed the visitors and, in some instances, went along with them on a tour of the plant and offices.

The teachers saw people at work,

watched machines turn out products and fired questions at foremen and workers. Each plant displayed its products and showed how they are used. At strategic points in the plants, posters and displays told the teachers, among other things, how prices of products are determined, what role the company plays in the local economy, and how the company aids civic enterprises. All teachers had lunch at the plants they visited. After that, they heard company officials talk informally about policies, problems and plans. Plant men answered questions the teachers asked.

The teachers' day ended late in the afternoon. Business men in New Britain were so impressed with the favorable reaction of the teachers that they want to make B-I-E Day an annual affair. They attribute much of the day's success to the cooperative spirit of foremen and workers, who knew the plans in advance and were primed to help.

Since few coal mines are located in large cities or towns, a program like the New Britain plan, if drawn up for a coal company, would have to be modified considerably. It might have to be a one-company or an all-coal-company affair, without participation by other industries. Special arrangements would have to be made for lunch and for travel to and from the mine and around the property. Also, handling large groups underground would be a tough problem. Even so, some workable plan could be arranged, not only for teachers but for other groups as well. Coal companies that have tried such a plan—The Hudson Coal Co., Scranton, Pa., and Hanna Coal Co., St. Clairsville, Ohio, to mention only two—have found that it works to the advantage of all concerned.

However, though plans like this can boost your company's outside public relations, a big chunk of the job still rests on your own shoulders, especially if your mine is in a small town and if your company is the biggest thing around. If that's your situation, you probably know most of the people in

town and, likewise, they know you.

That's where you have a big advantage over most business men. With the right approach, you can make the most of your opportunities for building public good will for yourself and your company right where you live and work. Here are some of the things you can do.

1. Drop in on the editor of the local newspaper and the manager of the radio station now and then for a friendly talk. You can do a lot to build up their confidence in your public spirit and in the stability of your business. Tell them news about your operations and the men who work for you and with you and about the new machines and equipment you're buying. Tell them how you feel about current issues and explain your position. But don't try to tell them what stand they should take on hot issues. Stick to the facts and you'll come out better in the long run.

2. Stop on the downtown sidewalk sometimes and swap stories with the local doctor, the preacher, a policeman, a storekeeper or a housewife. In these contacts, as in your relations with your workers and associates, cultivate the appearance of leisure. Don't give anybody reason to feel you're trying to brush him off.

3. Don't turn down an invitation to make a speech to the local Civitan Club or to any other civic or professional group. Tell them honestly and frankly how your business runs and what your problems are. If any of your hearers ask dumb questions, answer them patiently and fully, remembering that they probably don't know as much about coal mining as you do.

In addition to all these people close at hand, you can win the favor of people who are more remote—your customers, your suppliers and your competitors. Personal letters can be a big help in bringing them over to your side. Try writing to them once in a while just to express your views on current issues and problems and to show how your business and their business are all tied together. Tell your customers about the kind of coal you are equipping your plant to produce and the new machines you are installing. If there's a strike, tell your customers and your suppliers how it affects you and them. This way, you can build a strong bond that may help all of you improve your businesses and may stand in your favor if trouble comes your way.

Your contacts with customers and suppliers needn't stop with personal letters or with sales and invoices. If you print a magazine or newspaper for your employees, enclose a copy of it when you send out invoices at the end of the month or pay your bills. Lots of the things in your paper will interest your customers and suppliers as much as they interest your workers.

Don't overlook the men who represent you in your state capital and in Washington. They're part of your public, too. Be sure they rep-

resent you. That doesn't mean they have to vote your way on every question. It does mean they should know what your interests are and why you take a certain position. They can't know these things unless you tell them. Talk to them when they come home for a few days and write to them while they're making up their minds about pending laws. The truth is, most lawmakers look for word from home when questions come up. Be sure your representatives know what you believe in.



Stage 5—Coordinate Tactics With . . .

Other Business Men

National Programs

Other Coal Operators

Professional Groups

LOTS OF OTHER BUSINESS MEN have the same aims as yours. Like you, they want people—those outside the company as well as inside—to think well of them and their business, they want to get the facts about business and industry to the people and they want American industry to stay strong and free to go ahead on its own.

They're doing a good deal about it. They make speeches and play a strong hand in professional and industrial associations. They boost community enterprises. They direct a big share of their advertising toward informing the public. They exchange ideas among themselves. They pick up methods that have proved useful elsewhere and adapt them to their own needs. All told, it adds up to a pretty well coordinated effort in the direction of better public relations for American industry.

Coal, through individual companies and through concerted action, is joining in the effort. Leading anthracite companies have moved along these lines for a good many years and the Anthracite Institute has done a first-rate job of speaking for the industry and setting the pace for public-relations progress.

On the bituminous side, Bituminous Coal Institute has made a steady advance in the industry's behalf. The most progressive bituminous companies have taken up where BCI leaves off. Just recently, spurred by the need for concerted

action on specific issues, BCI and the National Coal Association made materials and methods available for a coordinated public-relations program at the grassroots level. That's a big step in the right direction. Whether it meets the need remains to be seen. Its success depends on how many individual companies put BCI-prepared materials and methods to work in their own home towns and how much imagination and skill they show in adapting the national program to their own local situations.

Another factor in the success of this program is the answer to the question, "Where do we go from here?" Nationally and locally, the program must be flexible and long-term. It must go beyond the issues now current because there will be other issues in the course of time. And it must do more than debate issues, because good public relations add up to a lot more than simply winning an argument. Far-reaching, all-inclusive, multi-directional, long-lasting and honest—those are the guide words for a sound and successful public-relations program.

BCI, NCA and the Anthracite Institute alone, though they will help by guidance and suggestion, cannot do the whole job. Back home, at the grassroots level, is the place where public opinion of the coal industry will be built, for better or worse. In the final analysis, it's the job of every individual company and every operating official.



TRIM SURFACE PLANT reflects extensive underground changes made in . . .

Modernizing Dawson

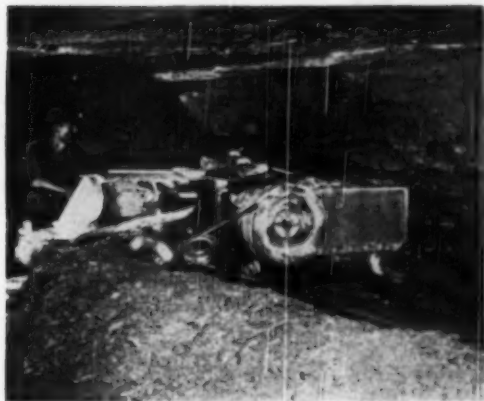
How a West Kentucky Mine Upped Productivity by . . .

- ▶ Improved Engineering ▶ Up-to-Date Equipment
- ▶ Modern Methods ▶ Closer Supervision

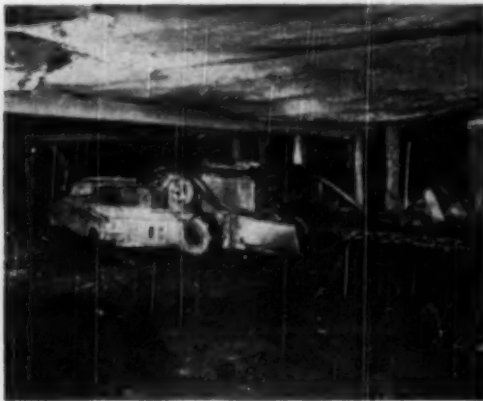
By W. A. BORRIES

President, Dawson Collieries, Inc., Dawson Springs, Ky.

A COMBINATION of engineering skill and up-to-date mining methods, plus steady replacement of obsolete units and close supervision at the face, has pushed productivity up to 11 tons per man per day at the Dawson mine of Dawson Collieries, Inc., Dawson Springs, Ky. Addition of washing facilities to the tippie makes the product easier to market and provides a cushion



BUGDUSTERS and hydraulic controls speed cutting. Better dusting makes it easier to load the fall.



LOW-PAN TRUCKS for mining machines move the shortwall cutters from place to place in the mine.

Loading Machines, Shuttle Cars, Belts, Track Haulage Work 550-Ft Rooms



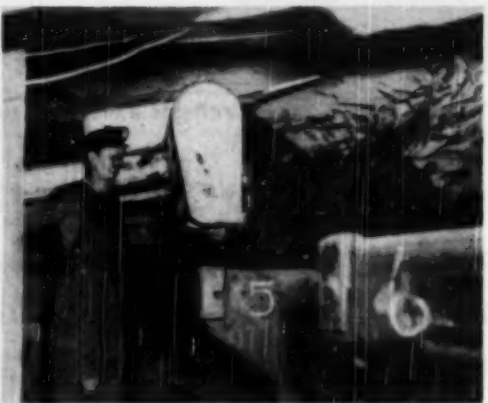
CROSSBARS on timber jacks protect the loading-machine operator even during clean-up.



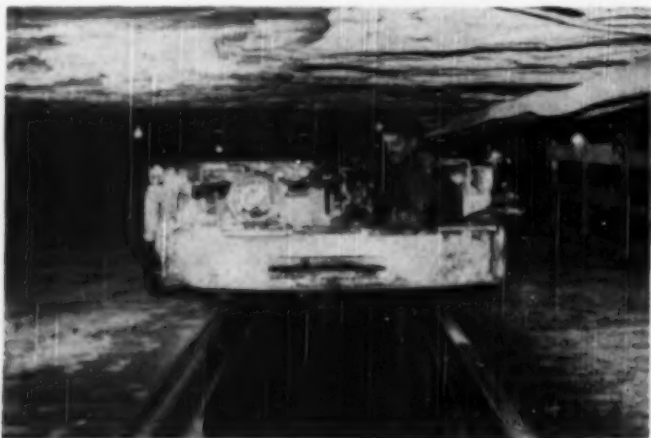
TWO CABLE-REEL SHUTTLE CARS, one righthand and one lefthand drive, serve each loading machine.



BELT TAKES COAL discharged by shuttle cars working in rooms as deep as 550 ft.



SEE-SAW DISCHARGE at end of belt delivers coal into mine cars without spillage.



STORAGE HOPPER receives coal from drop-bottom mine cars. Belt elevates the coal to the cleaning plant.



MINERS CARRY breathing apparatus on belt with lamp battery for use in emergency.

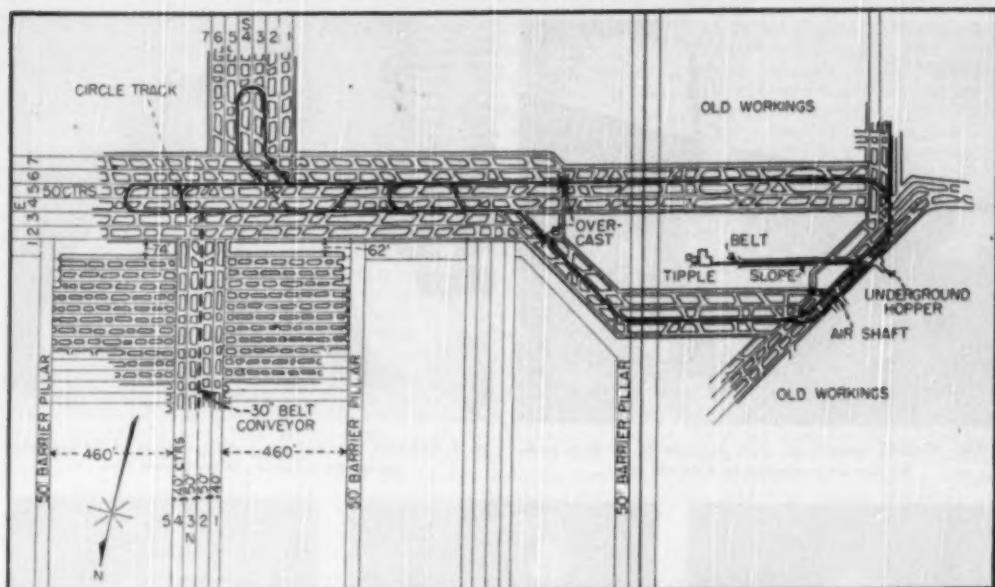


FIG. 1—MINING PLAN shows how track is installed in a circle around the belt head, permitting locomotive to move trips continuously without storing empties.

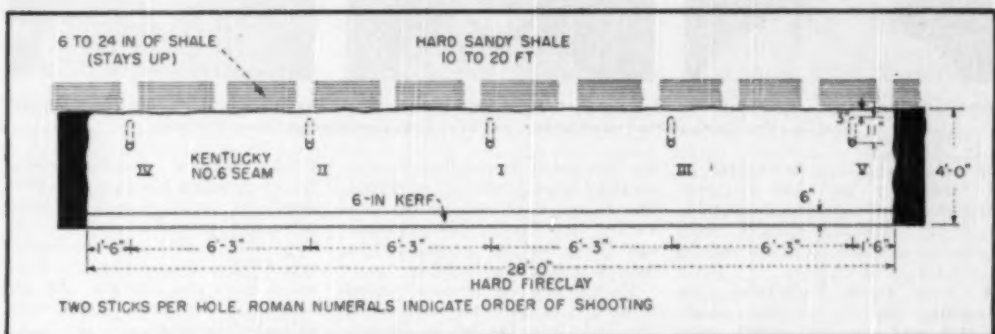


FIG. 2—SHOOTING PLAN shows how drill holes are charged and then shot in sequence.

against a possible slackening in demand.

Hauling coal underground and up to the tipple with rubber-tired shuttle cars, drop-bottom mine cars and belts, the Dawson men mine the No. 6 seam, about 48 in thick. Extraction runs about 60%. Though timbering cuts the working height, the roof is systematically supported to keep the men safe.

In the Dawson property, the seam dips approximately 3% southeast. From the opening of the mine in December, 1936, until December, 1948, mining had been confined to the west side of the property, where the grade against the loads ranged up to 4½%. This was done

because it was known that water would be troublesome on the west. Since mining has been changed to the east side, which took place at the close of 1948, the west side has been used as a sump for water storage. This water now is pumped to the surface and mixed with surface runoff for washery makeup.

● **Rooms Driven 550 Ft Deep**—A seven-heading mining plan is used for main-entry work and a five-heading plan for panels (Fig. 1). Centers for the 16-ft main headings are 50 ft. In the panels, the two center headings are on 50-ft centers and the outside headings on 40-ft centers. Rooms are driven 28 ft wide on 40-ft centers and are

advanced 500 ft from the belt heading. This gradual increase to a depth of 550 ft from a former depth of 200 ft came as a result of a many-stage experiment to see how deep rooms could be driven without impairing shuttle-car efficiency.

The old panel layout consisted of six 200-ft-deep rooms served from a key room. Shuttle cars discharged their loads directly into mine cars from ramps on opposite sides of the track.

The new panel layout calls for rooms driven in units of three instead of six. Most of the crosscuts between rooms are driven on a 45 deg angle to speed shuttle-car operation and shorten travel. Each

Management Skill and Efficient Methods Get High Output at Dawson



STEEL WEDGES brought the slope conveyor to its final grade. Wedges are arc-welded to plate and brace.



W. A. BORRIES, president and general manager of the company, sparked the rebuilding of the Dawson mine.



THESE MEN help speed progress at Dawson. They are: G. A. Stokes (left), mining engineer, Dawson Collieries, Inc., and Dawson Daylight Coal Co.; Virgil Smith, assistant superintendent, and Goley Boyd, superintendent, Dawson Collieries.

of the two shuttle cars working in a three-room unit has its own dumping point along the 30-in-wide, 1,300-ft (maximum length) belt conveyor that transfers the coal to the 3-ton mine cars.

• **Circle Track Facilitates Car Loading**—Before the new panel layout was adopted, empty cars were stored and loaded in the middle heading. Thus it was hard to have the track ready for the next move-up to a new territory when a panel was nearly worked out.

The present system, with the track installed in a circle around the belt head, permits moving trips of cars continuously by the locomotive as the coal is discharged into them. Belt discharge is made continuous, without spillage, by a Goodman Yo-Yo discharge conveyor at the belt head. The Yo-Yo, controlled by the belt operator, teeters at right angles to the belt and parallel to the rails, thus changing the direction of the flow of coal immediately and spanning the gaps between mine cars. This continuous flow, with two locomotives now used instead of one, as formerly,

has eliminated the need for the car-spotting hoist previously employed, the changeout of cars by the locomotive, and the troublesome spillage that used to accompany attempts to load continuously.

Each locomotive remains coupled to its trip at all times as it makes the circle from the belt to the hopper and back again. The belt operator, punching a series of buttons that flash signal lights around the curve of the track, is in communication with the motorman while the trip is loading and thus controls movement of the cars under the Yo-Yo.

• Modern Equipment Emphasized

—Worn-out or obsolete equipment is soon replaced at Dawson. Old 2½-ton Sanford-Day drop-bottom cars recently were replaced with 3-ton cars of much the same design. The company used three Type 512 DAH Goodman shortwalls equipped with 7½-ft bars, hydraulic controls and bugdusters; three 14 BU Joy loaders; and several Jeffrey A-7 hand-held drills with Hardsoc augers and bits.

The shortwalls are moved on Joy

T-2-5 low-pan mining-machine trucks traveling 125 fpm. The company's six shuttle cars, all of them cable-type Joy units, include two Type 32-E outfits and four newer-type 6-SC units equipped with four-wheel drive and steering. All underground equipment is double-shifted at Dawson.

Power at 275 v dc is fed into the mine from two 150-kw General Electric rotary-converter stations on the surface. The company now has on order a 300-kw Westinghouse Ignitron rectifier, which will be used on the surface near the producing area and will feed into the mine through drill holes.

• Locomotives Handle Main-Line Haul

—One 15-ton Type 165 A-04-C and one 8-ton 32-04-T Goodman locomotive, together with 26 3-ton Sanford-Day drop-bottom cars, haul the coal from the panel territories to the slope belt. The 15-tonner is 30 in high and is driven by two 120-hp motors. It has hydraulic brakes, hydraulic pole lift, Timken journal bearings, dynamic braking and full contactor control, including reversing. The 8-tonner

is 32 in high with two 40-hp motors and hand brakes. The cars are always pulled—never pushed—on the main line. A 6-ton Mancha battery locomotive is available for delivering supplies and for the use of pumpmen and inspectors.

On the main line, rails are 60-lb; in the panel entries, 45-lb. Track gage is 42 in. Creosoted hardwood ties are used throughout—5x7-in on the main line and 4x6-in in the panels.

● **Slope Belt Hoists Coal**—A 30-in five-ply 42-oz 330 fpm Goodyear slope belt carries the coal from the 100-ton dump hopper on the bottom to the tippie. The 635-ft long conveyor is installed on an 18-deg pitch (191-ft lift), flattening to 9 deg at the loading point, the location of a Jeffrey reciprocating feeder.

Steel wedges, shown in one of the accompanying illustrations, were used to bring the slope conveyor to its final grade. The wedges were sawed from the same 2-in-square stock steel used for fabricating timber jacks. Concrete footings with steel plates bolted to them were located at each angle-iron brace attached to the legs supporting the conveyor. The wedges were inserted near the legs between the steep pad plates and the angle-iron braces and were driven in enough to bring the conveyor to grade. On grade, each wedge was arc-welded to the plate and to the angle-iron brace.

● **Crews Comprise Ten Men**—The normal 10-man crew loading 240 tons per shift (trackless-panel operation) consists of a cutting-machine operator, driller, swing man assisting in both cutting and drilling, loading-machine operator, helper, two timbermen, two shuttle-car operators and a foreman. The drillers load, drill and shoot. Fig. 2 shows the drilling plan for a 28-ft room, how the holes are loaded and the order in which they are shot. King Red Crown permissible (1½x 8-in) is used in each hole and is fired with Atlas and King electric caps.

The bugduster-equipped short-wall has been a major factor in speeding up the face cycle, thus making it possible to have more falls prepared ahead of the loader. With the elimination of the dust hazard and the necessity for manual bugdusting, a three-man crew is able to carry out the face-preparation assignment. Undercutting and drilling are carried on simultaneously under far pleasanter conditions than ever known before.

Cleaner kerfs add to the efficiency of the shooting and naturally make for easier loading. Easier loading is reflected in less loader downtime and lower maintenance cost. Bugdusters make the shortwalls' work even easier because the carrying back and grinding up of the coal cuttings is eliminated and the machines use less power.

● **Timbering Done Systematically**

—Although timbering reduces the headroom beneath the bars in some sections to 42 in, it is done systematically at Dawson to provide safe working conditions and to attain 60% recovery. In both headings and rooms, 3x8-in by 14-ft-long crossbars are spaced on 5- to 6-ft centers and are supported on two posts. At the face, five timber jacks (Duff-Norton and Templeton-Kenly) are used to hold the two temporary bars. As the face is advanced about 6 ft per cut, a permanent bar must be installed each time a fall is loaded and the temporary bars and jacks moved forward. In sections with good top, straight posts with 2-in-thick headers are sufficient for holding the roof without diminishing safety.

Self-rescuers (MSA) weighing less than the battery for the Model W Wheat cap lamp also in use, are worn on the safety belts of all underground workers at Dawson. Each rescuer, which is U. S. Bureau of Mines approved, contains a small canister with nose clip and rubber mouthpiece and provides up to 30 min of protection against carbon-monoxide concentrations resulting from mine fires and explosions.

● **Maintenance Crews Work on Track**

—Among the underground maintenance crews on each operating shift is a two-man outfit—tracklayer and helper—who maintain the haulage track and build stoppings. One pumpman is required on each shift. There are two inside mechanics working on the first shift but only one on the second shift. One day mechanic, however, starts 1½ hr late and takes care of any breakdowns that might otherwise delay the starting of equipment on the second shift.

A four-man crew goes on duty on the third shift. Two men rock-dust and deliver supplies. The other two grease and make minor equipment repairs. One greaser, charged with the responsibility for repairs, is paid the mechanic's rate. One face boss also acts as fireboss for both shifts and goes in 2 hr before the first shift starts.

● **Preparation Includes Washing**

—The first Dawson tippie was de-

stroyed by fire in August, 1945. However, using expert civil engineering available within the company and securing structural steel wherever available, for this was near the close of the war, Dawson had a new four-track arc-welded tippie ready by the following February. The capacity of the new tippie is 150 tph. The sizes that can be prepared simultaneously are: (1) 3/16-in carbon, (2) 1x 3/16 stoker or 1x½ pea, and (3) 1x3/16 stoker or ½x3/16 baby stoker. Two-stage crushing, instead of single-stage, gives a more uniform product and favors the production of a higher percentage of the top size.

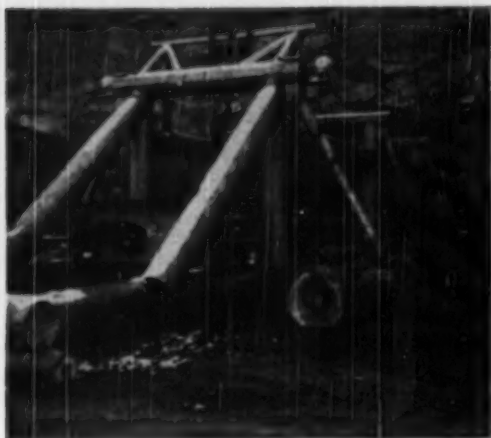
The newest addition to the tippie and a further step in modernization at Dawson is a McNally-Norton three-cell unit washer. This was added to the old tippie as an auxiliary structure in the summer of 1949. Stoker coal now is crushed as before in a two-stage operation with complete separation of sizes. For washing, all sizes are conveyed together to the washer, where they also are mixed, dewatered and rescreened. Carbon (3/16x0) is not washed at present since the market for raw carbon is holding fairly steady. However, the plant is laid out so that it will be easy to wash this size if the need arises. The McNally-Norton washer was added without interrupting tippie operations. Facilities to wash the carbon should be no more difficult to install.

● **Manpower Needs Kept at Minimum**—The tippie is operated two shifts, each crew consisting of a foreman, a picker, an operator, a washbox man and greaser, and three ground men. On the day shift, two men clean and patch the railroad cars with empty rock-dust bags.

An outside man lowers supplies into the mine with a slope hoist and also trucks refuse from the tippie. Two mechanics work in the surface shop on the day shift and two men on the night shift. One man takes care of the bath house and the lamp house.

Officials and supervisors at the Dawson mine are: Mr. Borries, president and general manager; G. A. Stokes, mining engineer; Go-lay Boyd, superintendent; Virgil Smith, assistant superintendent; Arthur Hobgood, electrician; Roy Workman, James McClearn, James E. Hopper, Arnold McKnight, Otis Franklin and Richard Johnson, face-bosses; and Tom Lee and Orvil Beshear, tippie foremen.

Coal Age New-Methods Report — 1950 Series, No. 4



AUGER MACHINE is 72 ft long, weighs 60 tons. When not in use, back section of auger is lifted hydraulically and suspended above carriage. Operator rides on the self propelled carriage. Two motors drive the auger.



LOADING CONVEYOR is carried by a pivoted hitch at the machine and a steering-type axle.



BRANCHING CHUTE on truck-loading conveyor makes loading continuous and avoids spillage.



MOVE-UP TO NEXT PLACE takes only 60 sec after auger is retracted. Truck and 'dozer move machine up.



STOCK-PILED COAL is pushed by 'dozer into tipple-feeding hopper if trucks are delayed.



BUSY PIT SCENE shows how a West Virginia operation has achieved . . .

Better Auger Mining

How Big Grafton Coal Co. Auger Units . . .

- Bore Out Coal Under the Highwall
- Produce Big Tonnage at High Speed
- Move Easily Around the Mine
- Foreshadow Contour-Stripping Changes

MINING 800 TONS OF COAL during a shift and loading it into trucks for haulage to the tippie is not an unusual performance for the crew of four men who operate an

improved type of auger mining machine which, in the experimental stage, was first put to work in July, 1949, at Pepper mine of the Grafton Coal Co., Clarksburg, W. Va.

The company is owned and managed by 35-yr-old Charles E. Compton, whose hobby is designing and building more efficient equipment for contour stripping. Mr. Compton does not let greater size and increased weight of machines stand in the way of achieving his goal. An earlier example of this trait is the fleet of 27-yd rock wagons he designed and built at the mine for simultaneous high-speed handling of spoil from shovels and leveling the berm as the stripping proceeds (*Coal Age*, August, 1948, p. 84).

As of December, 1949, auger mining machine No. 1 at Pepper

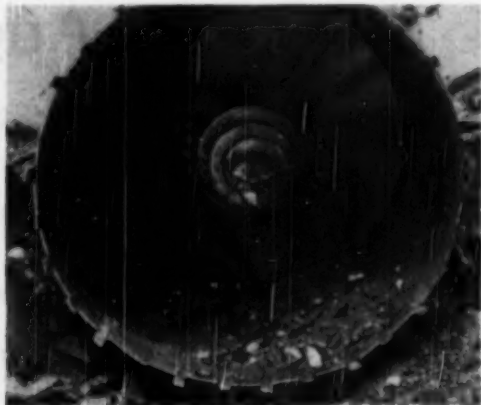
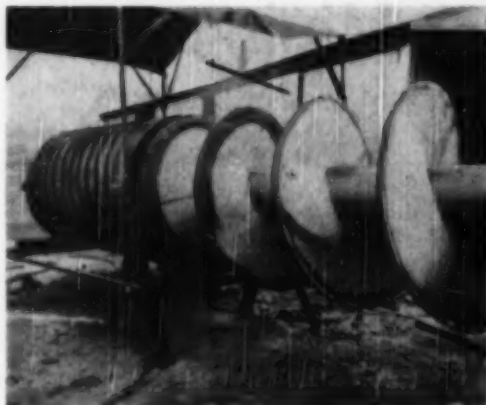


HOLES LINE UP in abandoned pit where coal has been auger-mined under highwall. Recovery averages over 60%. On a highwall turn (right), holes run together at extreme depth, causing extensive roof falls inside, but highwall holds intact.

Large-Size Augers Offer New Possibilities in Hillside Stripping



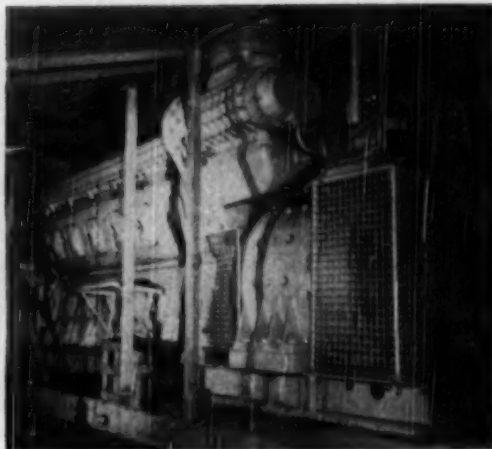
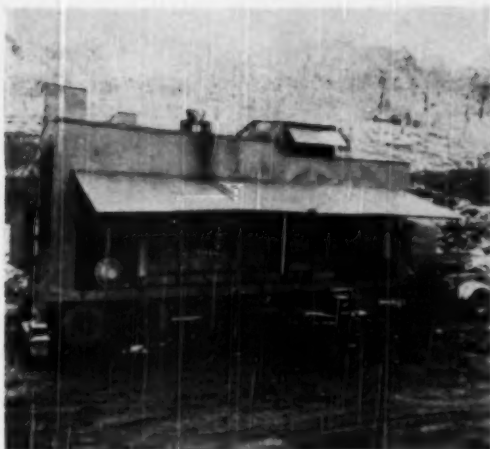
BIG SIZE OF AUGERS, 5 ft in diameter, is suited to Pittsburgh seam's thickness. The 40-ft rear section (left) is fitted to the 62-ft front section by a rigid male-and-female coupling.



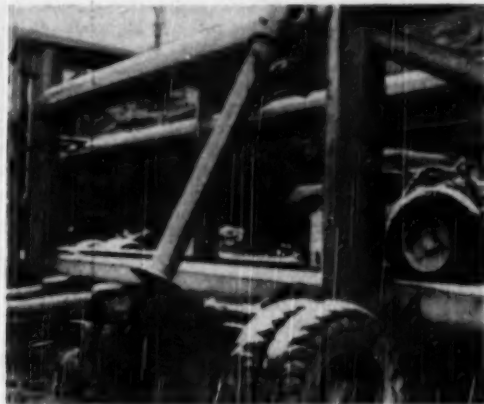
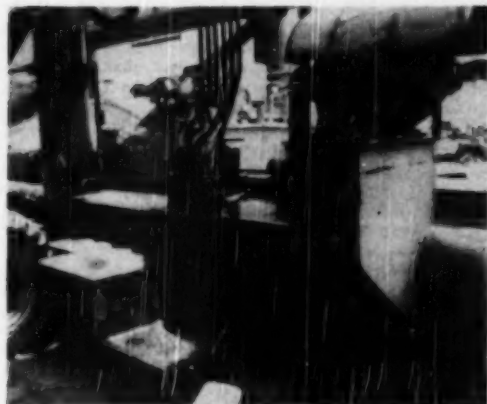
CUTTING AND BREAKING BARREL is fixed on the business end of the 62-ft auger section. Bits on the barrel shell (right) bore a core and bits in the center break the core into 2x24-in lumps. Auger worm carries coal back.



EACH 100-FT HOLE yields nearly 80 tons. W. J. Higinbotham, foreman, shows how some pillars (left) exceed the average 4-in thickness. Even without pillars, where holes overlap, roof holds up well.



MOBILE DIESEL UNIT can provide power for two machines. The power plant consists of a 1,000-hp engine driving a 600-kw, 550-volt dc generator. Unit is fitted with tongue for towing by tractor.



HYDRAULIC PUMP (left) is close by hydraulic control station on the No. 2 machine. Each carrying unit of the machine is a truck rear and hinged to the machine frame and leveled by a brace containing a hydraulic jack.

mine had mined 20,000 tons. On that date, machine No. 2 was nearing completion and machine No. 3 was under construction. No. 1, shown in the accompanying operating views taken on a snowy day late in November, is 72 ft long. Together with a rubber-mounted loading conveyor which is attached to trail the machine, it weighs approximately 60 tons. Mr. Compton has applied for patents on some of the machine's features, including internal parts of the auger core barrel, which produces lump coal. He emphasizes that the machine is designed for "well planned operations providing continuous pits several mines in extent." A berm width of at least 80 ft is required for the machine now working at Pepper mine.

What the Auger Accomplishes High-Speed Mining Lump Output Good Recovery

AN AUGER 5 FT IN DIAMETER is used for the operation. The actual time for mining a 5-ft hole 100 ft deep is 20 min. In other words, the speed of auger feed averages 5 fpm. Moving the 60-ton machine, after retracting the auger, takes less than 60 sec. Approximately 10% of the coal in the bore is cut and the remainder is broken by a mechanical action which results in

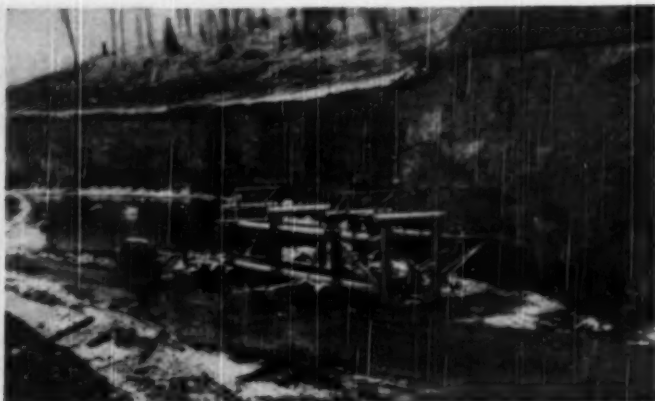
lumps up to 24 in. Accurate screen tests have not been made, but company officials estimate that at least 80% of the output is in the range of 2x24 in.

It is the aim to leave pillars 4 in thick between successive holes, but the roof and walls have stood up so well that no particular care is taken to get that exact thickness. When the machine is being moved for the next hole, an operator signals for a stop at the approximate position. Thus the holes may lap over slightly or the stop may be made late enough to make the pillar as much as 12 in thick. In some instances, where as many as three holes have been bored with slight overlaps, the top seems to hold just as well. Around corners, the holes at the front are on the same close

Two Additional Auger Units Near Completion at Grafton Coal Mine



GRAFTON'S OWNER and manager, C. E. Compton, built the machines.



MACHINE NO. 2 nears completion in the pit. All cutting, fitting and welding is done at the mine and out in the open. This machine was working in April.

spacing and therefore cut into each other at the back. Where such mining has been followed by rather extensive roof fall at the back of the holes, the face of the highwall nevertheless has stood intact.

Only in a few places in the abandoned pits have roof caves occurred at the face of the highwall. These happened a month or more after

the auger mining had traversed that section. At Pepper mine, with highwalls 45 to 55 ft high, there seems to be no danger from falling rocks to men or to the machine. The auger operator, who rides on the feed carriage, comes no closer than 15 ft to the highwall and his position ranges from 15 to 74 ft away most of the time.

trials with a positive chain-driven carriage. Hook rollers with adjusting screws at each wheel allow for increasing the pressure between tires and runway channels to secure greater traction. During normal operation of the machine, the eye can detect a slight slippage of the tires every so often.

As of April 18, 1950, when the photographs of machine No. 3 were made, machines No. 1 and No. 2 were working and both were being pulled ahead by tractors or trucks. However, hydraulic motor equipment had been received and was ready to be geared to two or more of the trucks of each machine to make them self-propelling.

Electric power for machines Nos. 1 and 2 is provided by a rubber-mounted diesel generator set consisting of a GE Electro-Motive Corp. 1,000-hp, 12-cylinder diesel with direct connection to a 600-kw, 550-volt dc generator. It was mounted at the mine on a war-surplus trailer which was reinforced for the extra load and fitted with front trucks and tongue for towing by tractor.

How the Auger Machine Works

Following the Seam Handling Waste

Positioning for Boring

ALL OF THE BORING at Pepper mine has been in the Pittsburgh seam, which here ranges from 6 to 8 ft in thickness, lies practically level and is comparatively free of local rolls. A 5-ft auger was selected as the maximum that could be used in all places without hitting top or bottom. No difficulty has been encountered in aiming the auger to follow the seam. Percentage of recovery with the 5-ft auger in 6-ft coal leaving 4-in pillars is something over 62½%. For the most part, the territory that the Grafton Coal Co. has stripped has not been previously deep-mined. Wherever possible, the company buys both surface and mineral.

It is not unusual to encounter clay veins. When a slab of this material appears, the loading truck is pulled ahead and the material is spilled on the ground. If the auger seems to be following the clay vein, the hole is abandoned. In that case, the auger is reversed in direction to leave the material in the hole as the auger is retracted.

The machine proper is carried on six dual-wheel rear ends taken from scrapped trucks, using a total of 24 rubber tires. Each rear end is equipped with a short frame hinged at one end of the machine and held down at the other end by a tubular brace containing a hydraulic jack. Operation of hydraulic control valves to extend or retract the jacks raises and lowers the machine to position it for mining height. If the machine is to be moved from one general location to another—a job done by tractor—it is raised to maximum height by the jacks and then, after special rubber-tired trucks are placed under the extreme ends, the jacks are retracted to raise the working wheels clear of the ground.

The feed carriage, carrying two 83-hp, 550-volt dc traction motors and their reduction gearing to the auger, is mounted on four rubber-tired propelled wheels which feed the auger into the seam. Tire slippage provides the limiting pressure found necessary after preliminary

How the Machines Are Built

Framework and Carriage

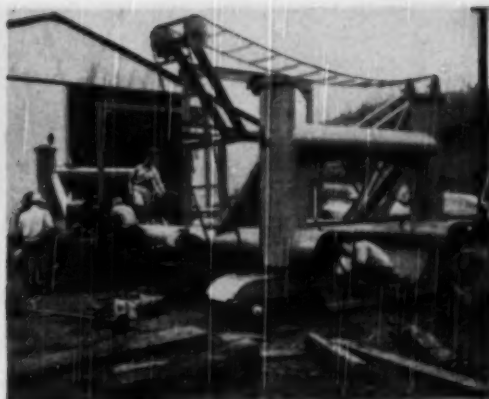
Cutting and Conveying

Traction and Feed

THE MACHINE IS BUILT of steel pipe. All of the cutting, fitting and welding was done at the mine and out in the open. The two pipe columns of the machine frame next



HIGHWALL END of Machine No. 2 shows hook and hydraulic hoists that handle 40-ft auger section.



NEWEST MACHINE, No. 3, now is nearing completion. Like the others, it is being built on the property.

to the highwall contain hydraulic jacks and spuds, which steady the machine.

The 102-ft auger is in two sections, one of 62 ft, including the cutting and breaking barrel, and another of 40 ft with the screw flight only. Hydraulic hoists handle the 40-ft auger section and store it overhead while the 62-ft section is sumping in. When the longer section is all the way in, the carriage is disconnected from the auger and moved to the rear end of the machine and the 40-ft section is lowered and connected to complete the 100-ft hole.

Steel-Pipe Backbone

A steel pipe forms the backbone of the auger. Great rigidity is required, as indicated by the fact that the pipe size has been increased to 18 in in the auger last built. No coal is carried inside the pipe. Sections of the newest auger have round male and female connections, whereas the first augers have square-type connections, which are shorter and less rigid. Kennametal mining-machine bits are used on the boring and breaking barrel. On the outside of this barrel are screw threads about $\frac{1}{2}$ in high, which move to the auger proper the cuttings that get on the outside of the barrel.

A flight cross conveyor on the machine proper carries the coal from the mouth of the hole to an elevating and truck-loading conveyor which is supported at the lower end by a pivoted hitch and at the other end by a steering axle with dual rubber-tired wheels. A branching chute with a diversion gate permits changing from one truck

to another without a stop and without spillage. At the level of the chute, a platform is provided for the crew member directing the truck loading.

The practical depth limit, or hole length, for this type of mining is not known. Since it has proved so easy to take 100 ft with the No. 1 machine, it is reasonable to assume that a much greater depth is possible.

Overlapping Holes Scheduled

Machine No. 3, which embodies a number of improvements aimed at more mobile design, higher recovery and less operating labor, was nearing completion on April 18, when the last photographs were made. It will use augers in 24-ft sections 42 in in diameter, which will permit drilling holes one above

the other, with the lower hole drilled last and overlapping the upper hole by a part of the circle.

The No. 3 machine is mounted on four crawler treads, two of which are propelled by drive shafts with universal joints. The four hydraulic jacks between the treads and the machine are quickly adjustable in a 4-ft vertical range. The auger is driven by a 150-hp Cummins diesel engine mounted on the rubber-tired carriage. The travel of this carriage—auger feed and retraction—is powered by a hydraulic motor giving a speed range of 0 to 136 fpm.

A gasoline engine drives the self-contained flight conveyor, which elevates high enough to discharge directly into trucks. This engine also drives the shafts extending to the propelling treads on the unit.

How Stripping May Be Changed

Lower Contour Highwalls

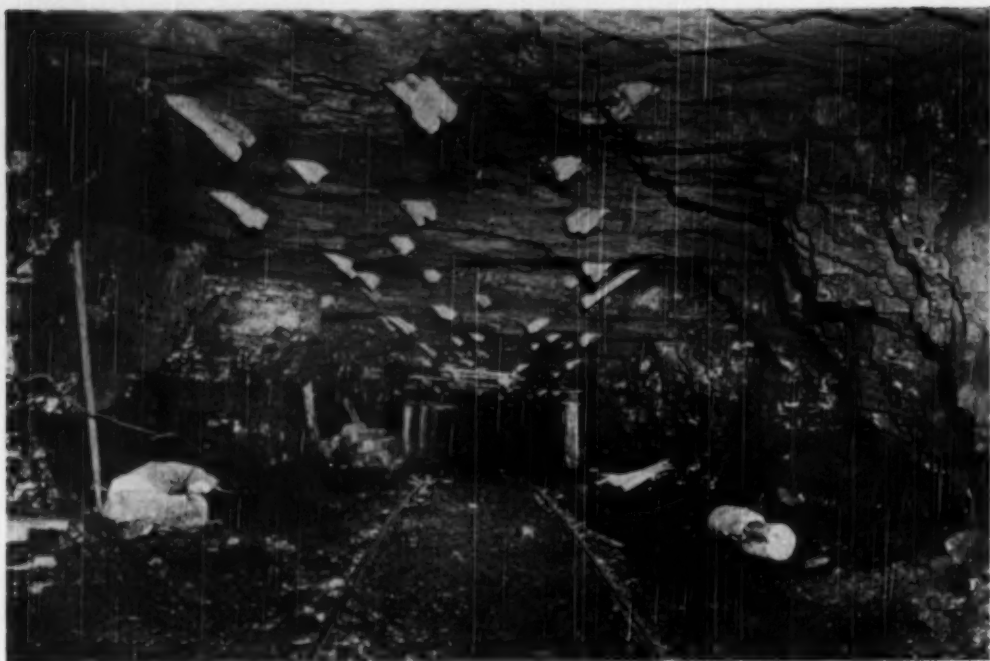
More Coal per Cut

Less Overburden Bother

ADVENT OF THIS EQUIPMENT for auger mining puts a different light on strip mining in hilly terrain. Stripping may become a secondary operation necessary to open up the crop and provide a level bench along which an auger machine can operate. Officials of the Grafton Coal Co. now believe that in their territory stripping beyond a 45-ft highwall does not pay with their type of stripping equipment (*Coal Age*, Aug., 1949, p. 84), though they did strip to 55 ft in many places.

In discussing the large auger machines, Mr. Compton modestly states that they have exceeded 100 tons per hour. He foresees great possibilities for them at well planned stripping operations in the future.

Lynn Allen is chief engineer of the company; L. W. Weekly, superintendent; Frank Delli-Gatti Jr., design engineer; W. W. Drummond, mechanical superintendent; and W. J. Higinbotham, foreman over welding and auger-machine operations.



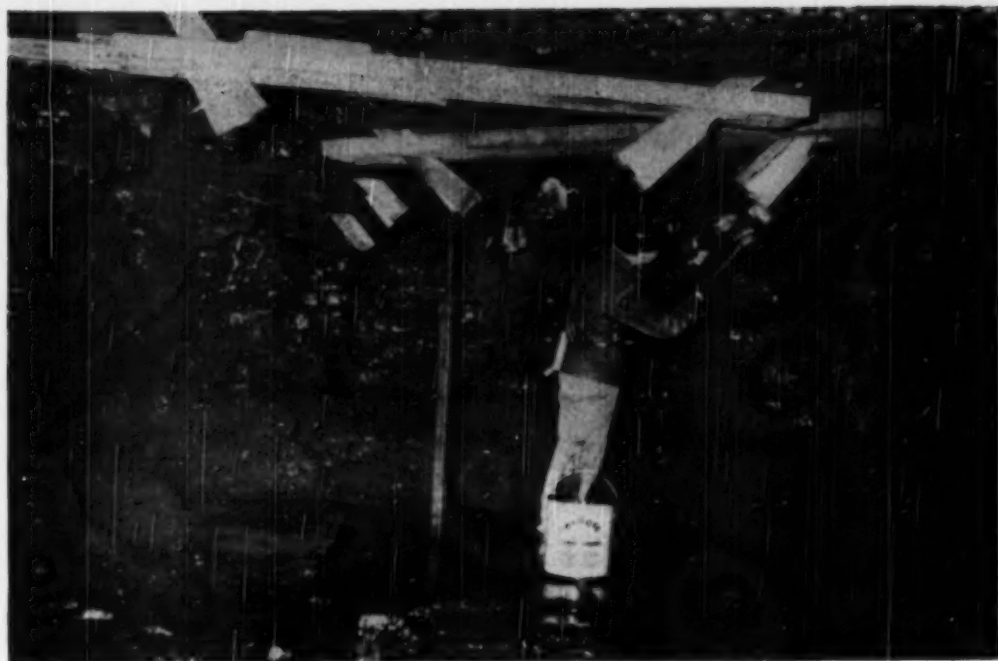
WOOD PINNING IN A HEADING at Rio Verde mine. "Roof control has ceased to be a problem . . . and no clean-up crews are necessary." Long protruding length of pin at center right was a result of top coal being shot away.



TYPICAL ROOF CONDITION in Rio Verde mine. Percolating water made holding shale top difficult with conventional timbering.



WOOD PINS STAY PUT, as shown in this view of a heading where the top is being shot for an overcast.



WOOD PINS ALSO SUPPORT plank-type crossbars at Rio Verde, at turnouts or other places with unusually bad top.

Pinning Roof With Wood

Why, How and Results at Rio Verde Mine, Pioneer in the Use of Wood Pins for Roof Support

By STERLING S. LANIER JR., President, Norton Coal Corp., Nortonville, Ky.

BECAUSE OF TOP CONDITIONS in our new Rio Verde mine, which went into operation late in 1948, we concluded fairly soon that bolting was the answer. But consideration of steel bolts brought us squarely up against the problem of corrosion and early failure as the result of an acid-water condition in the roof. In addition, it seemed to us that a different type of bolt or pin might offer some advantages from several standpoints, including cost.

● **Why Wood Was Chosen**—Wood was a logical material to consider. First, its cost is relatively low. Second, it appeared that it would provide the necessary strength in a size not too large for convenient use. Third, it would effectively resist acid water and, if treated with

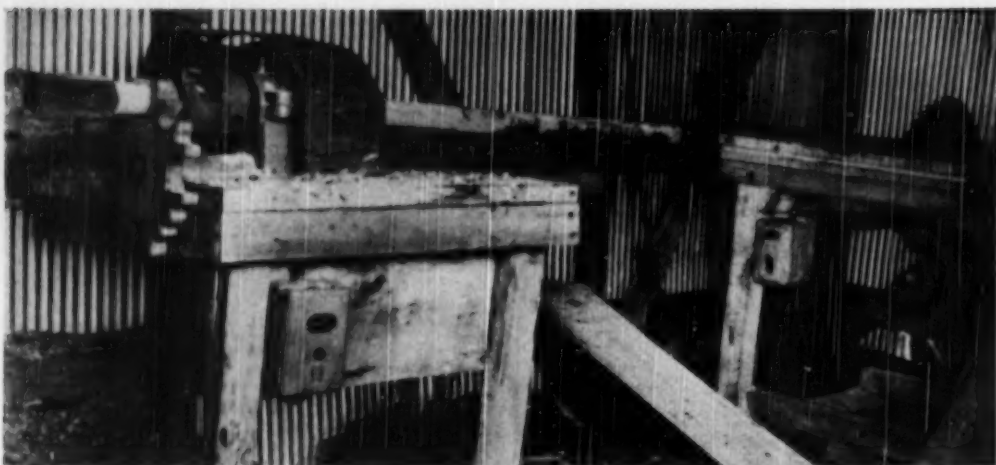
a good preservative to prevent decay, would have the necessary life. Fourth, less special equipment is needed in installing wood pins and the importance of the human element—as in getting nuts tightened properly—is reduced.

In experience since the first installations were made, what appear to be other advantages have come to light. If the wooden pin is made to fit the hole snugly, it bonds to the strata for its entire length. The effect seems to be better locking of the strata together into a beam without the necessity of applying heavy stresses to the rock, as is necessary in anchoring other types of bolts in the holes and applying pressure from the bottom to get the beam effect. With a tight pin, spalling of the roof at the bot-

tom does not destroy the pin's effectiveness. Slacking of the sides of the holes is eliminated because the pins completely fill the holes.

● **Pin Considerations**—The size of the wooden pins involves some increase in the drilling problem and, under certain conditions, the need for greater strength will increase pin size even more. Wood is not a uniform material and therefore care is necessary in selecting pin material, although at Green River we have had good results taking wood at random. Where pins will be in service for some time, decay must be considered. Treatment with a good preservative is the answer, though it increases the cost.

We opened the Rio Verde mine, at Green River Sta., Carrolltown, in Muhlenberg County, western Kentucky, to produce from the Green River seam, which provides an excellent steam and domestic coal. The seam averages 7 ft in thickness and the coal is medium hard and blocky in nature, with pronounced face and butt cleats.



PIN-TURNING EQUIPMENT can produce 50 pins per hour at an approximate cost, untreated, of 16¢ each.

• **The Rio Verde Problem**—Over the coal is 5 to 10 ft of soft stratified shale—3- to 4-in layers separated by thin layers of cementation materials (possibly clay or silt). The cementation layers become soft and slimy from water percolating down from the main sandstone roof, which is water-bearing.

The bond between the shale and the sandstone is poor and serious trouble was encountered from falls, particularly at turnouts. At such points use of 8x10 timbers by no means assured protection against falls up to the sandstone. Steel was an alternative, but would have been subject to corrosion from the acid in the water coming down from the sandstone. Steel roof bolts had the same corrosion disadvantage.

With the Norton operating staff and state and federal inspectors all working together, the application of the wooden pin was successfully developed. The first installation was made in July, 1949, and a patent has been applied for. To date, over 6,000 ft of roof has been pinned throughout the mine, primarily in headings making up the main entry. These headings are driven 14 ft wide. Room width is 20 ft.

• **Making the Pins**—Originally, we started with a pin 5 ft long and, as it has proved effective, we have standardized on this length. The pins are prepared from 3-in square stock in a hand-fed turning machine equipped with a rotary cutting disk fitted with fixed knives. The pins are turned to a diameter of 2½ in, except for 4 in at one

end, which is left square. Over-all length is 5 ft 4 in.

For best results, a good grade of oak or hickory, well seasoned and cut with the grain, should be used. With our outfit an average of 50 pins can be made in an hour at a total cost—untreated—of approximately 16¢ each, depending on the cost of the lumber. Treating, where necessary, can be done by brushing on a preservative. We are using a special Osmose compound. The pins also may be dipped or the preservative may be applied to only the ends with a brush after the pins are in place. Treatment of the protruding ends is especially important since these ends are exposed to the air and thus more subject to attack by fungus.

• **Installing the Pins**—Originally, the pins were designed to fit the holes tightly and to be turned in by using a square socket on the end of the drill threadbar. We plan to return to that system in the future, but at present are installing the pins with wedges at the top and bottom. The wedges are split from regular timber wedges, keeping the width not over 2 or 2¼ in. To receive the wedges, each end of the pin is split by a saw cut 15 in long, with the cut at one end at right angles to that at the other to reduce any tendency toward splitting.

Holes for installing the pins are made with track-mounted drilling machines used in drilling the coal for air-breaking. Average hole diameter is 2¾ to 3 in. Holes are drilled at as high an angle as possible. Usually, because the end of the threadbar strikes the floor, the

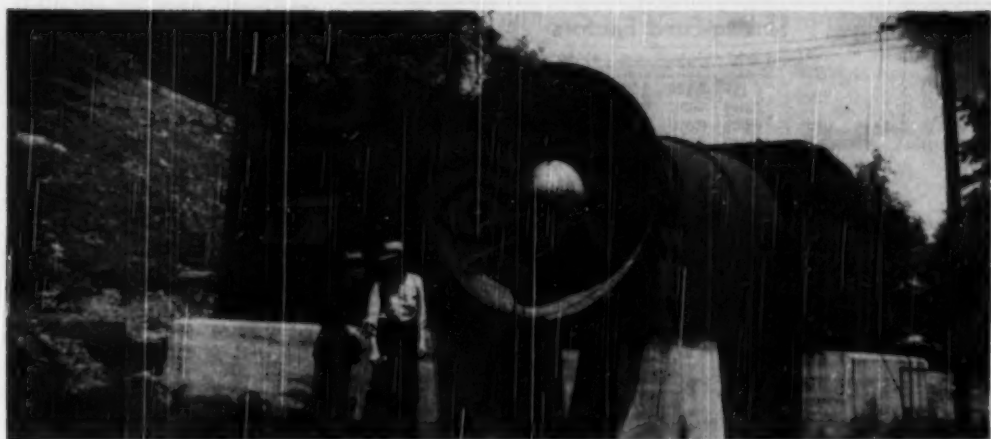
angle is 45 deg or less. Cut depth is 8 to 8½ ft, and the usual practice is to drill two rows of holes per cut, three holes against the face and two holes 4 ft back. Some 12 to 15 in of coal is left an additional protection for the top.

The drill is followed by a "pin-setter," who places a wedge in the slot in the round end of the pin, drives the pin to the back of the hole, and then sets it by driving it up over the wedge with an axe. He then drives a second wedge in the outer slot.

• **Pins for Crossbar Support**—The pins also are employed to support crossbars of 2x10 or wider plank. The pins are inserted through oval slots in the ends of the planks and then are set in the usual fashion. These are used only at turnouts or at other places where the top is unusually bad.

We are not as yet using pins in room work because of the drilling problem involved. Each 8-ft fall in a 20-ft place would require at least eight roof holes, and we have not been able to drill these holes in cycle with our present equipment.

Roof control has ceased to be a serious problem since we went to wooden pins, and no clean-up crews are necessary. In addition, our experience so far has proved that wood pinning is much more effective in our case than conventional crossbarbing, and material costs are only about 20% those of the former method. We believe that wooden pins of the best material and manufactured commercially would sell at approximately 50% of the price of a same-size steel-bolt assembly.



MINE AIR SHAFT can be built at lowest possible cost without impairing safety or efficiency.

How to Determine . . .

Economic Air-Shaft Size

What Needs to Be Known to Arrive at the Most Economical Dimensions for Air Shafts—How the Formulas Are Derived and How the Solutions Are Worked Out

By M. H. HALL

Chief Engineer, Olga Coal Co., Coalwood, W. Va.

TO DETERMINE the most economical dimensions of an air shaft for a mine, the following must be known:

C_e , cost of excavation in dollars per cubic yard.

C_l , cost of concrete lining in dollars per cubic yard.

S , sinking-fund factor based on useful life of the shaft and the interest rate on money. A table of sinking-fund factors appears elsewhere in this article.

C_p , cost of power in dollars per kilowatt-hour, i.e., \$0.01.

C_f , coefficient of friction. For unlined shafts through sedimentary rocks, this coefficient is 0.000 000 007. For concrete-lined shafts, it is 0.000 000 003.

V , volume of air required in cubic feet per minute continuously.

W , width of a rectangular shaft in feet.

E , over-all efficiency of motor, drive and fan. Over a long period

of time, 66% has been found to be a fair average and is used throughout this study.

The derivative of each of the following equations contains one or more powers of the unknown. The equations containing only one power of the unknown can be solved by logarithms, by use of the log-log slide rule, or, more laboriously, by arithmetic.

The equations containing more than one power of the unknown can be solved by Horner's method for higher equations. In the light of the writer's experience, however, the solutions are more easily arrived at by trial and error.

Six different cases will be employed to show the problems and how they may be solved. In these problems, all linear dimensions are in feet; all excavation and concrete prices are per cubic yard; and the volume of air is in cubic feet per minute but is written as thousands of cubic feet per minute in all final

equations, i.e., 400,000 cfm is written as 400.

I
Determine the economic radius, "R," of a circular unlined shaft. The annual sinking-fund cost per vertical foot of shaft is:

$$S C_e \pi R^2$$

The annual power cost per vertical foot of shaft is:

$$C_p 2 \pi R \left(\frac{V}{\pi R^2} \right)^3 8,760 C_f$$

The total annual cost per vertical foot of shaft is:

$$S C_e \pi R^2 + C_p 2 \pi R \left(\frac{V}{\pi R^2} \right)^3 8,760 C_f$$

Clearing,

$$0.1164 S C_e R^2 + \frac{0.06 V^3 C_p C_f}{R^3} =$$

total annual cost per vertical foot.

Placing the first derivative with respect to R equal to 0, we have,

$$0.233 S C_e R - \frac{0.30 V^3 C_p C_f}{R^4} = 0$$

Substituting 0.000 000 007 for

Sinking-Fund Factors

Years	3%	3½%	4%	4½%	5%	6%	7%	8%
10	0.117	0.120	0.123	0.126	0.130	0.136	0.142	0.149
15	0.084	0.087	0.090	0.093	0.096	0.103	0.110	0.117
20	0.067	0.070	0.074	0.077	0.080	0.087	0.094	0.102
25	0.057	0.061	0.064	0.067	0.071	0.078	0.086	0.094
30	0.051	0.054	0.058	0.061	0.065	0.073	0.081	0.089
40	0.043	0.047	0.051	0.054	0.058	0.066	0.075	0.084
50	0.039	0.043	0.047	0.051	0.055	0.063	0.072	0.082
60	0.036	0.040	0.044	0.048	0.053	0.062	0.071	0.081
70	0.034	0.039	0.043	0.047	0.052	0.061	0.071	0.081
80	0.033	0.037	0.042	0.046	0.051	0.061	0.070	0.080
90	0.032	0.037	0.041	0.046	0.051	0.060	0.070	0.080
100	0.032	0.036	0.041	0.046	0.050	0.060	0.070	0.080

C_p , and representing the volume of air in thousands of cubic feet, i.e., 400,000 cfm to be written as 400, we have,

$$(I) R = \sqrt[7]{\frac{9.01 V^3 C_p}{S C_s}}$$

Numerical Example:

In this and all other numerical examples, the following data will be used:

$$C_s = \$20.00; C_i = \$50.00$$

$$S = \$0.06344; C_p = \$0.01$$

$$V = 400,000 = 400 \text{ in all final equations}$$

$$W \text{ (when required)} = 14; T = 1 \text{ ft}$$

Therefore,

$$R = \sqrt[7]{\frac{9.01 V^3 C_p}{S C_s}}, \text{ or,}$$

$$R = \sqrt[7]{\frac{9.01 \times 400^3 \times 0.01}{0.06344 \times 20}} = \sqrt[7]{\frac{11,532,800}{0.6344}}$$

$$\text{Log } 11,532,800 = 7.061 \quad 9348$$

$$\text{Log } 0.6344 = -1.802 \quad 3632$$

$$7 \quad 7.259 \quad 5716$$

$$1.037 \quad 0817$$

The answer is 10.8914 ft.

II

Determine the economic length of a side of a square unlined shaft, with "X" equalling the length of a side.

Total annual cost per vertical foot of shaft is:

$$\frac{S C_s X^4}{27} + \frac{C_i 4 X \left(\frac{V}{X^2}\right)^2 8,760 C_p}{44,250 E} = \frac{0.037 S C_s X^4 + 1.188 C_i V^2 C_p}{X^2}$$

Placing the first derivative with

respect to X equal to 0 and clearing, we have,

$$0.074 S C_s R - 5.94 C_i V^2 C_p = 0$$

Substituting 0.000 000 007 for C_i and writing V in thousands:

$$(II) X = \sqrt[7]{\frac{562 V^3 C_p}{S C_s}}$$

Numerical Example:

$$X = \sqrt[7]{\frac{562 \times 400^3 \times 0.01}{0.06344 \times 20}} = \sqrt[7]{\frac{7,119,360,000}{0.6344}}$$

$$\text{Log } 7,119,360,000 = 8.856 \quad 9463$$

$$\text{Log } 0.6344 = -1.802 \quad 3632$$

$$\sqrt[7]{\frac{9.054 \quad 5831}{1.293 \quad 5120}}$$

The answer is 19.66 ft.

III

Determine the economic length of an unlined rectangular air shaft with a width "W" given.

The total annual cost per vertical foot of shaft is:

$$\frac{S C_s W X}{27} + \frac{(2W + 2X) \left(\frac{V}{WX}\right)^2 8,760 C_p C_i}{44,250 E}$$

Clearing, we have,

$$0.037 S C_s W X + \frac{0.594 V^3 C_i C_p}{W^2 X^3} + \frac{0.594 V^3 C_i C_p}{W^2 X^3}$$

Placing the first derivative with respect to X equal to 0,

$$0.037 S C_s W - \frac{1.782 V^3 C_i C_p}{W^3 X^4} - \frac{1.188 V^3 C_i C_p}{W^3 X^4} = 0$$

Multiplying through by $W^3 X^4$,

substituting 0.000 000 007 for C_i , we have,

$$S C_s W^4 X^4 - 337.2 V^3 W C_p - 224.8 V^3 C_p X = 0, \text{ or,} \\ (III) S C_s W^4 X^4 - 224.8 V^3 C_p X = 337.2 V^3 W C_p$$

Numerical Example:

$$0.06344 \times 20 \times 14^4 X^4 - 224.8 \times 400^3 \times 0.01 \times X =$$

$$337.2 \times 400^3 \times 14 \times 0.01 =$$

$$\text{Total annual cost.}$$

$$24,371 X^4 - 287,740,000 X =$$

$$6,042,600,000$$

$$X^4 - 11,807 X = 247,942$$

$$\text{Try 25 for X. Then,}$$

$$X^4 - 11,807 X = 96,460 \pm$$

$$\text{Therefore, 25 is too small.}$$

$$\text{Try 30. Then,}$$

$$X^4 - 11,807 X = 456,790 \pm \text{large.}$$

$$\text{Try 27. Then,}$$

$$X^4 - 11,807 X = 212,652 \pm \text{small.}$$

$$\text{Try 28. Then,}$$

$$X^4 - 11,807 X = 284,060 \pm \text{large.}$$

$$\text{Try 27.5. Then,}$$

$$X^4 - 11,807 X = 247,221; \text{small.}$$

$$\text{Try 27.6. Then,}$$

$$X^4 - 11,807 X = 254,406; \text{large.}$$

$$\text{Try 27.52. Then,}$$

$$X^4 - 11,807 X = 248,651; \text{large.}$$

We now know that the true value of X lies between 27.50 and 27.52 ft, which is near enough for our purpose.

IV

Determine the economic radius of a circular air shaft with a concrete lining T feet thick.

With R as the inside radius of the completed shaft, annual sinking-fund cost per vertical foot is:

$$\frac{S C_s \pi (R + T)^2}{27} + \frac{S C_s \pi [(R + T)^2 - R^2]}{27}$$

The annual power cost per vertical foot of shaft is:

$$2 \pi R \left(\frac{V}{\pi R^2}\right)^2 8,760 C_i C_p = \frac{44,250 E}{\pi R^3}$$

Total annual cost per vertical foot of shaft is:

$$\frac{S C_s \pi (R + T)^2}{27} + \frac{S C_s \pi [(R + T)^2 - R^2]}{27} + \frac{2 \pi R \left(\frac{V}{\pi R^2}\right)^2 8,760 C_i C_p}{44,250 E}$$

Clearing,

$$\frac{S C_s \pi (R^2 + 2 R T + T^2)}{27} + \frac{S C_s \pi (2 R T + T^2)}{27} + \frac{0.0602 V^3 C_p C_r}{R^3}$$

Placing the first derivative with respect to R equal to 0, we have,

$$\frac{2 S C_s \pi R}{27} + \frac{2 S C_s \pi T}{27} + \frac{0.301 V^3 C_p C_r}{R^4} = 0$$

Multiplying through by R^4 , substituting 0.000 000 003 for C_p , and writing volume in thousands only, we have:

$$(IV) S C_s R^5 + S C_s T R^4 + S C_s T^2 R^3 - 3.88 V^3 C_p = 0$$

Numerical Example:

$$\begin{aligned} 0.06344 \times 20 \times R^5 + \\ 0.06344 \times 1 \times 20 \times R^4 + \\ 0.06344 \times 50 \times 1 \times R^3 = \\ 3.88 \times 400^3 \times 0.01 \end{aligned}$$

$$R^5 + 3 R^4 = 7,828,500$$

$$\text{Try 9 for } R. \text{ Then,}$$

$$R^5 + 3 R^4 = 6,377,292$$

Therefore, R is too small.

Now write,

$$9 R^5 + 3 R^4 = 7,828,500$$

$$12 R^4 = 7,828,500$$

$$R = 9.3129 \text{ ft}$$

Now write,

$$9.3129 R^5 + 3 R^4 = 7,828,500$$

$$R = 9.273 \text{ ft}$$

Now write,

$$9.273 R^5 + 3 R^4 = 7,828,500$$

$$R = 9.278 \text{ ft}$$

Now write,

$$9.278 R^5 + 3 R^4 = 7,828,500$$

$$R = 9.277 \text{ ft}$$

We now know that the true value of R lies between 9.277 and 9.278 ft.

V

Determine the economic inside length of a side of the square air shaft with a concrete lining T feet thick.

Let X equal the economic length of a side. Then, the annual sinking-fund cost per vertical foot of shaft will be:

$$\frac{S C_s (X + 2 T)^2}{27} + \frac{S C_s [(X + 2 T)^2 - X^2]}{27}$$

The annual power cost per vertical foot of shaft will be:

$$\frac{4 X \left(\frac{V}{X^3} \right)^2 8,760 C_r C_p}{44,250 E}$$

The total annual cost per vertical foot of shaft will be:

$$\frac{S C_s (X + 2 T)^2}{27} + \frac{S C_s [(X + 2 T)^2 - X^2]}{27} + \frac{4 X \left(\frac{V}{X^3} \right)^2 8,760 C_r C_p}{44,250 E}$$

Placing the first derivative with respect to X equal to 0, multiplying through by X^6 , substituting 0.000 000 003 for C_p , and clearing, we have:

$$(V) S C_s X^7 + 2 S C_s T X^6 + 2 S C_s T^2 X^5 = 240.52 V^3 C_r$$

Numerical Example:

$$\begin{aligned} 0.06344 \times 20 \times X^7 + \\ 2 \times 0.06344 \times 20 \times 1 \times X^6 + \\ 2 \times 0.06344 \times 50 \times 1 \times X^5 = \\ 240.52 \times 400^3 \times 0.01 \\ X^7 + 6 X^6 = 485,290,000 \end{aligned}$$

Try 17 for X. Then,

$$X^7 + 6 X^6 = 550,150,000$$

Therefore, 17 is too large.

Try 16 for X. Then,

$$X^7 + 6 X^6 = 369,098,000; \text{ small.}$$

Try 16.5 for X. Then,

$$X^7 + 6 X^6 = 454,000,000; \text{ small.}$$

Now write,

$$16.5 X^7 + 6 X^6 = 485,290,000$$

We get 16.67 as a closer approximation.

Now write,

$$16.67 X^7 + 6 X^6 = 485,290,000$$

We get 16.67, which is the correct value of X.

VI

Determine the economic length of a rectangular concrete-lined air shaft, with the width "W" and the thickness of the lining "T" given.

Let X equal the economic length. Then, the total annual cost per vertical foot of shaft is:

$$\frac{S C_s (W + 2 T) (X + 2 T)}{27} + \frac{S C_s [(W + 2 T) (X + 2 T) - WX]}{27}$$

$$\frac{(2 W + 2 X) \left(\frac{V}{W X} \right)^2 8,760 C_r C_p}{44,250 E}$$

Expanding and clearing,

$$\frac{S C_s (W X + 2 W T + 2 T X + 4 T^2)}{27} + \frac{S C_s (2 W T + 2 T X + 4 T^2)}{27} + \frac{0.594 V^3 C_r C_p}{W^3 X^3} + \frac{0.594 V^3 C_r C_p}{W^2 X^2}$$

Differentiating with respect to X and placing the first derivative equal to 0, we have:

$$\frac{S C_s (W + 2 T)}{27} + \frac{S C_s (2 T)}{27} - \frac{1.782 V^3 C_r C_p}{W^3 X^4} - \frac{1.188 V^3 C_r C_p}{W^2 X^3} = 0$$

Multiplying through by $W^3 X^4$, substituting 0.000 000 003 for C_p , clearing and transposing, and writing V in thousands:

$$(VI) S C_s W^3 X^5 + 2 S C_s T W^3 X^4 + 2 S C_s T^2 W^3 X^3 = 96.2 V^3 C_r X = 144.3 V^3 C_r W$$

Numerical Example:

$$\begin{aligned} 0.06344 \times 20 \times 14^3 \times X^5 + \\ 2 \times 0.06344 \times 20 \times 1 \times 14^3 \times X^4 + \\ 2 \times 0.06344 \times 50 \times 1^3 \times X^3 \times 1 = \\ 96.2 \times 400^3 \times 0.01 \times X = \\ 144.3 \times 400^3 \times 0.01 \times 14 \\ 28,472 X^5 - 61,568,000 X = \\ 2,585,856,000 \end{aligned}$$

$$X^5 - 2,162 X = 90,823$$

Try 20 for X. Then,

$$X^5 - 2,162 X = 116,760$$

Therefore, 20 is too large.

Try 19 for X. Then,

$$X^5 - 2,162 X = 89,243; \text{ small}$$

Try 19.1 for X. Then,

$$X^5 - 2,162 X = 91,792; \text{ large}$$

The true answer lies between 19.0 and 19.1 ft.

No attempt has been made in the preceding to enumerate the many other factors entering into the design of air shafts. They are known by all experienced mining men and their discussion is beyond the scope of this study.

Velocity head has not been included in the data from which these equations have been derived. It is very nearly constant for all economically designed shafts, and should not exceed 0.15 in water gage.

The cost of ventilating equipment and power lines to the site will, in some instances, enter into the design but has not been included in this study.



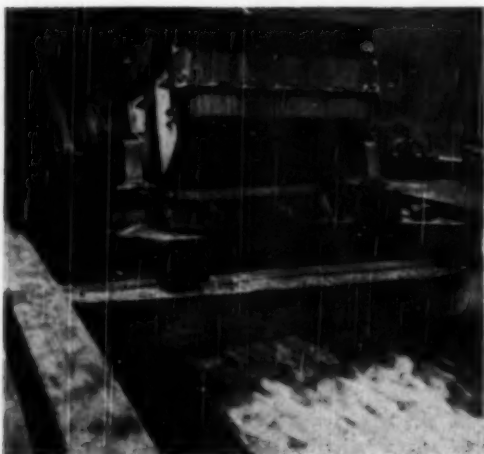
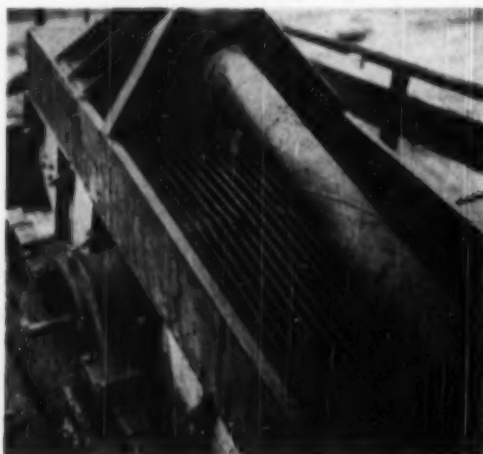
SOURCE OF GUYAN RIVER CO. PRODUCT—dredge boat pumping coal and sand during high water. At the tipple on the bank, the egg coal is hand-picked and the nut-slack is loaded into trucks for transportation to the coal-reclamation plant.

River Plant Recovers . . .

Coal From Water

Guyandotte River Provides Quality Egg and Nut-Slack Sizes for Guyan River Co.—Dredging, Screening, Picking and Tabling Produce Approximately 20,000 Tons a Year—Six-Man Crew Handles 50 to 200 Tons Daily—Plant Addition Under Way to Remove Wood Chips

NATURAL FORCES, which have cleaned, polished, blended and dedusted coals from several Logan County seams, are responsible for the uniformity, high heating value, low sulfur and freedom from dust that are outstanding characteristics of the egg and nut-slack sizes produced by the Guyan River Co., Midkiff, W. Va. The output,



RIVER COAL IS RECEIVED by vibrating screen (left), which removes most of the wood chips from the egg coal on the top deck and the sand and minus $\frac{1}{8}$ from the nut-slack on the lower deck. The sand and minus $\frac{1}{8}$ are carried away in a sluice box (right).



COAL FROM THE RIVER BOTTOM starts on its way through the rotary digger head (left), shown raised at the end of the shift. Principal equipment on the dredge boat consists of a gasoline engine and 8-in sand pump (right-hand illustration).

amounting to 50 to 200 tons per day and approximately 20,000 tons per year, is a reclamation by-product of the company's principal business—supplying sand for mine locomotives and building construction. The operation is said to be the only one in the United States reclaiming previously mined bituminous coal in quantity from a river.

Since the location is 35 mi downstream from the City of Logan, and since most of the mines of Logan County are on the Guyandotte River and its tributary creeks, it is surmized that most of the coal being reclaimed has traveled 40 to 60 mi. In that natural laundering process,

only the lighter-weight pieces have been carried this far downstream and, of course, all friable sharp corners have been knocked off and the fine sludge washed away.

● **River Renews Supply**—Judging from experience to date, Howard Elkins, owner of the Guyan River Co., figures that there will be no let-up in the amount of river coal available for at least the next 5 to 10 yr. High water always brings a new supply to fill the holes that have been pumped out. Because of the rounded corners and lack of any shiny cleavage faces, the egg size resembles briquetted fuel.

Equipment in use at the time of this writing consisted of a pumping dredge boat; a screening and sand-storage installation, termed a sand-and-coal tippie, 3 mi upstream from Midkiff; and another sand-and-coal tippie, including a fine-coal washer and termed a coal-reclamation plant, at Midkiff, but across the river from the loading ramp on the C. & O. Ry. Egg is trucked directly from the pumping-point sand-and-coal tippie to the ramp, while the nut-slack size is trucked to the coal-reclamation plant for processing, and then to the ramp.

● **Dredging and Picking**—The



COAL-RECLAMATION PLANT for nut-slack at Midkiff. On the river bank is the gas-engine-operated wash-water pump. No let-up in the river coal available is expected for 5 to 10 yr.

Additional Plant Facilities Planned to Improve River-Produced Coal



CLOSE-UP OF PLANT, showing truck dump hopper, raw-coal elevator (right) and calcium-chloride vat under construction (left).



CONCENTRATING TABLE cleans nut-slack size, operating at double rated capacity because of the shape of the water-worn coal.



PREMIUM EGG reclaimed from the Guyandotte River enroute from the coal-and-sand tippie to the railroad after screening and hand-picking. At the right, Howard Elkins, owner, shows the round briquet-like egg coal. This operation reportedly is the only one in the U. S. reclaiming previously mined bituminous coal in quantity from a river.



dredge boat carries a 6-in Pekar sand pump driven by a 145-hp Waukesha engine operated on natural gas. The digger suction head, which is capable of working to 24 ft below deck level, is the standard rotary type driven through a flat belt. Wire ropes stretched across the river and passing over hand winches on the boat enable the operator to move in and out from shore. A 6-in spiral pipe carries the water and dredged material to the sand-and-coal tippie on the shore.

There the material pours onto a Robins 3x6-ft Hydrex double-deck vibrating screen. The top deck consists of parallel bars with 1-in openings. Through it, with the water,

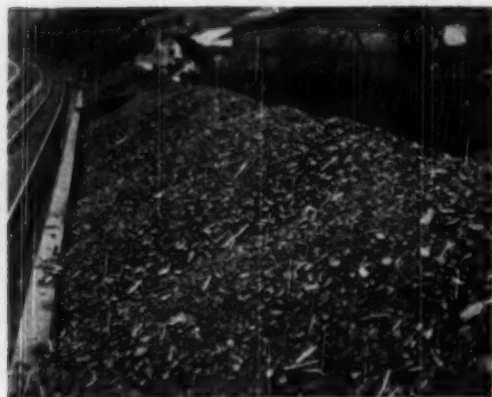
sand and fine coal, goes about 90% of the water-logged bits of wood originating from timbering operations, sawmills, scrapped mine lumber and the like. These splinters range up to 6 in long and average about 4 in.

One man picks out the few pieces of larger wood and some trash on a 12-in belt 12 ft long carrying the egg size to the truck-loading hopper, thus leaving an absolutely clean 3½x1 product. This egg coal, aggregating about 10% of the output, averages close to 14,500 Btu and is close to 3% in ash and 0.3% in sulfur.

The sand, sticks, gravel and minus 1-in coal drop to the lower deck of the Hydrex screen, this deck

consisting of ¼-in-opening fine-wire (0.047) Tylo cloth. The 1x½-in coal and other material are sluiced to a truck-loading hopper for transportation 3 mi down paved Highway No. 10 to the coal-reclamation plant. Minus ¼-in coal is separated from the sand by wasting it to the river over a controllable weir in the sand hopper under the Hydrex screen. It is estimated that the quantity of this fine coal going back into the river exceeds 300 tons per week. The principal reason for its rejection is to maintain the nut-slack as a dustless product.

• **Fine-Coal Preparation**—Gravel and sand which cling to the lumps of coal are completely removed at



TRUCK LOAD OF NUT-SLACK COAL (left) leaving for the railroad ramp directly across the river but a quarter-mile away via the highway and bridge. Chips in loaded dustless nut-slack (right) will be removed with calcium-chloride vat being installed.

the reclamation plant. From the truck-dump hopper, the raw feed is elevated to a 32-ton steel tank, from which it is fed hydraulically, at about 30 tph, to a SuperDuty concentrating table. Although rated at only 15 tph, this table handles the greater tonnage because of the round-corner character of the water-worn coal.

A table operator adjusts the feed at frequent intervals by jiggling a lever connected to the hydraulic feed gate. At present he also picks a great deal of the water-logged wood splinters from the coal as it moves over the table. This picking, however, will soon be eliminated by additional equipment.

From the table, the cleaned product is sluiced through a launder to a dewatering box and then is elevated to a 40-ton truck-loading hopper. The elevator is a Joy flight conveyor remodeled to carry buckets with perforated bottoms. These drain holes are countersunk on the outside to prevent clogging. A typical railroad car analysis (at destination) of this nut-slack is as follows: moisture, 8.91%; ash, 5.17%; sulfur, 1.04%; Btu, 13,011.

Wash water for table operation and sluicing is supplied by a 3-in Fairbanks-Morse pump driven by a 25-hp LeRoi gas engine. Electric motors operated from purchased power drive the elevators, table and other equipment of the reclamation plant and the screen at the coal-and-sand tipple.

● **Chip-Removal Plans**—An improvement to the plant now under way is aimed at removing the water-logged bits of wood that now go out with the finished product.

This wood content has little effect on the heating value, but to some it mars the appearance, while to others it serves as an identification of the company's uniform product.

These bits of wood will be removed from the nut-slack by calcium-chloride float-and-sink at about 1.2 specific gravity. With this new equipment the table will be operated differently. All the sticks will leave the table automatically in the first 18 in but will carry with them considerable coal of the highest quality. The other product from the table will be finished coal. The sticks and contained coal will be sluiced through another launder to a heavy-duty Syntrol dewatering vibrator with a deck of 1/32-in openings. This semi-wet product of sticks and high-grade coal will drop to a belt delivering to a vat 9x12 by 12-ft deep containing the calcium-chloride solution.

Floating wood and occasional light cinders will flow over a weir. After the vat has filled with the "de-wooded" coal, the solution will be drained off to a storage tank. Water-tight gates at the bottom of the vat will then be opened to draw the coal off into a truck. After reclosing the gates, the solution will be pumped back.

An operating crew consists of six men as follows: dredge-boat operator, picker, sand screener, truck driver, reclamation-plant operator and handy man.

Haulage equipment consists of an "EH" Mack truck, a 2-ton heavy-duty Reo and a 1½-ton heavy-duty Studebaker, all with dump beds.

● **How Reclamation Started**—The company began pumping sand from

the river in 1946. After two years or so, it was observed that the dredged-out basins filled with material that was largely coal. The first month of coal reclamation (May, 1949) produced 44 railroad cars.

When the river stage is normal and pumping is being done from locations formerly dredged out, and where almost pure coal has accumulated, production will reach 60 tph. During high water pumping can be continued at one spot for a considerable time because the current continues to bring sand and coal. Practically all the company's output is shipped by rail for domestic and industrial uses.

Three pumping sites are presently available. From the present one, the dredge boat can be moved 3 mi downstream to pump directly to the coal-reclamation plant, or it can be moved to a third pumping location. The river is not navigable at normal stage. Therefore, the company equipment does not include a tow boat or sand barges.

● **Coal's Origin**—Apparently none of the coal being reclaimed from the river at Midkiff comes from erosion of coal seams. The source is gob piles along creek tributaries and along the main river. Until recently, a large percentage of the production of the Logan field was cleaned only by hand-picking, which wasted a lot of coal clinging to lumps of bone and slate. Moreover, of the few cleaning plants that were installed many years ago, most of them lost a great deal of coal to the refuse. The new modern plants are contributing little or no sizable coal to the river.



PUBLIC RELATIONS AND SUPERVISORY TRAINING—H. L. Walker (left), University of Illinois; A. C. Spurr, Monongahela Power Co.; H. C. Livingston, Union Pacific Coal Co.; E. R. Price, Inland Steel Co., session chairman and AMC program-committee chairman; and Julian D. Conover, AMC secretary.



MINE SAFETY—A. D. Sisk (left), Kentucky Department of Mines & Minerals; C. R. Stahl, Eastern Gas & Fuel Associates; J. J. Forbes, U. S. Bureau of Mines; Dan Harrington, formerly of the U. S. Bureau of Mines, panel moderator; Ralph Whitman, Ingle Coal Co.; and R. J. Howell, Glen Alden Coal Co.

AMC Coal Meet Notes Progress,

Advances Marked on All Fronts — Strong Future Seen for Coal in Better Machines, New Equipment, Improved Methods and Trained Manpower — Safety and Pensions Studied as Over 1,800 Attend Cincinnati Meeting

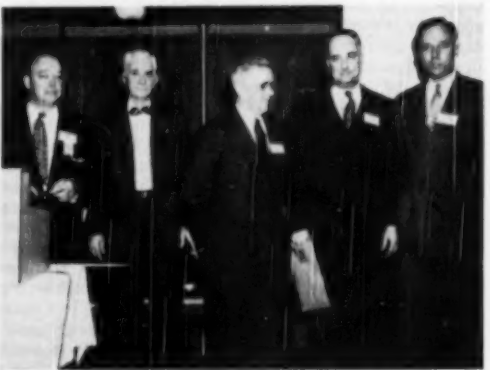
TRENDS IN EQUIPMENT AND METHODS in deep and strip mining, coal preparation for coarse and fine sizes, power, time studies, maintenance,

safety, public relations and employee relations held the spotlight as more than 1,800 coal men, equipment manufacturers and allied inter-

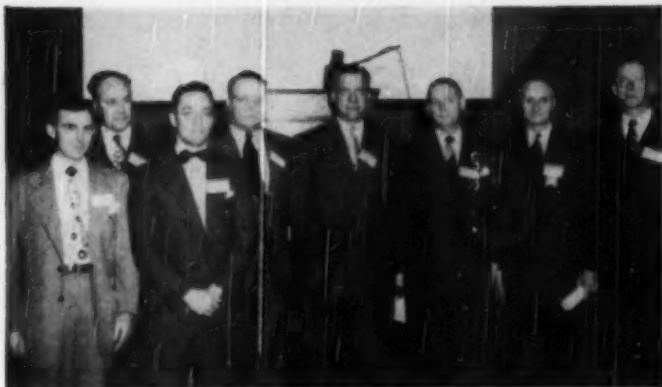
ests met for the Annual Coal Convention, American Mining Congress, in Cincinnati, Ohio, April 24-26. In 11 sessions, some of them running concurrently, industry leaders staked out the industry's advances in the past year and longer and pointed out the needs, the hazards and the promises that lie ahead. Throughout the sessions ran a spirit of progressive enterprise, reflected in the often-expressed belief that coal can solve its own problems if left free of government interference and granted a fair climate for competition.



STRIP MINING—Power, blasting and communications: Front row, L. E. Briscoe, Ayrshire Collieries Co.; Maurice Quinn, Sinclair Coal Co.; back row, J. Robert Basley, J. Robert Basley, Inc., session chairman; L. W. Berco, United Electric Coal Cos.; and Andrew Hyslop Jr., Hanna Coal Co.



STRIP MINING—Power, machines and overburden: L. Russell Kelce (left), Sinclair Coal Co., session chairman; E. B. Agee, secretary, Indiana Coal Producers Association, floor committeeman; J. E. Borland, Westinghouse Electric Corp.; R. M. Dickey, Bucyrus-Erie Co.; and J. J. Huey, United Electric Coal Cos.



CONTINUOUS MINING—Russell Herby (left), Pennsylvania Coal & Coke Co.; F. Eubanks, Old Ben Coal Corp.; C. E. Hugus Jr., Reliance Electric & Engineering Co.; R. M. Hunter, Rochester & Pittsburgh Coal Co.; W. E. Hess, Jones & Laughlin Steel Corp.; W. J. Phillips, Sunnyhill Coal Co.; M. H. Forester, Pittsburgh Consolidation Coal Co., session chairman; and M. F. Cunningham, Goodman Mfg. Co.

Scans Future

Public Relations And Mine Supervision

CONVINCING PROOF of the coal industry's strength is shown in the high wages miners earn, the tonnage mined, the money spent for growth and improvement and the rising efficiency of operations, and coal asks no more of the government than fair treatment and a chance to solve its own problems, said Julian Conover, AMC secretary, who opened the gen-

eral session Monday morning. E. R. Price, manager, coal properties, Inland Steel Co., and national chairman, AMC program committee, presided at the meeting. Principal speakers were: A. C. Spurr, president, Monongahela Power Co., Fairmont, W. Va.; H. C. Livingston, vice president, Union Pacific Coal Co., Rock Springs, Wyo.; H. L. Walker, head, Department of Mining and Metallurgical Engineering, University of Illinois, Urbana; and G. R. Spindler, director, School of Mines, West Virginia University, Morgantown.



COAL DRYING—C. R. Bourland (left), New River Co., floor committeeman; James Hyslop, Hanna Coal Co., session chairman; F. P. Colhoun, Rochester & Pittsburgh Coal Co.; F. R. Buckley and George Land, West Kentucky Coal Co.; W. T. Turrall, Lahigh Navigation Coal Co.; R. L. Sutherland, combustion engineer, Trues-Traer Coal Co.; and John L. Erisman, Dryer Department, Link-Belt Co., Chicago, Ill.

Public Relations — "The story of what you are doing can make its best impact at home, among the people with whom you're working and with whom you rub shoulders at the bank or the drugstore or the movies," Mr. Spurr said. Drawing on his experience in the electric-power industry and citing the close relationship between his industry and coal, he urged coal men to strengthen their public relations locally, using the materials provided by Bituminous Coal Institute and adapting them to local situations, and to cement their positions as citizens, not merely residents, in their communities.

A helpful tool in reaching employees is the company magazine or newspaper, Mr. Spurr said. If the coal and power industries want to head off nationalization and socialization, they must communicate to their employees and neighbors the facts about hidden and growing taxes, big government, and threats to individual liberty and free enterprise.

Commenting on Mr. Spurr's address, Ralph Mulligan, director, BCI, pointed out that both power and coal, because they provide essential services and goods, have unique responsibilities to the public. Coal, like power, now is being operated in the public interest and asks no more than freedom from government interference, a fair competitive climate and a curb on union monopoly power. He stressed the importance of grassroots public opinion to show the folks at home that coal is strong and basic.

Training Future Supervisors—"It is our opinion that attitude allowing decisive action demonstrating the individual's desire to be a definite part of management is the deciding factor in the selection of a trainee for supervisory activity," Mr. Livingston reported. By and large, training supervisors is a local problem, dependent on geographical location and available training facilities. With this in mind, the Union Pacific Coal Co. has set up a program to train high-school graduates and engineering graduates.

After a high-school man is employed, he is rotated through all phases of mechanical preparation and loading, haulage, timbering and mechanical and electrical maintenance for 5 yr, the minimum time required by state law for certification. After the first 2 or 3 yr, if his superiors see promise in him and he shows a desire to get ahead, he is encouraged to enter evening training classes for six-month periods under the top management men at the mine. These studies, covering electricity, mathematics, physics, chemistry, ventilation, hydraulics, practical mining and human relations, are designed to lead to certification.

Under Wyoming law, engineering graduates are credited with 3 yr of practical experience because of their college training. Also, their first 2 yr

American Mining Congress Cincinnati Meeting



TIME STUDIES AND MAINTENANCE—R. L. Adams (left), Old Ben Coal Corp., session chairman; L. Saylor, C. W. & F. Coal Co.; P. R. Paulick, consulting mining engineer; G. L. Judy, Consol. (W. Va.); A. W. Asman, Penn. State College; and John K. Berry, Consol (Ky.).



PLANNING FOR PENSIONS—Hugh B. Lee (left), Maumee Collieries Co., session chairman; Roscoe C. Edlund, Fred Rudge, Inc., New York City; J. W. Myers, Standard Oil Co. (N. J.), New York City; and C. N. Crichton, Johnstown Coal & Coke Co.



HAULAGE AND POWER—Davis Read, West Kentucky Coal Co., session chairman; J. O. Crea, West Virginia Engineering Co.; David Stoetzel, General Electric Co.; R. C. Huffman, Monongahela Power Co.; G. T. Atkins, Barnes & Tucker Co.; W. F. Roberts, Jeffrey Mfg. Co.; and G. F. Leatherman, Inland Steel Co.



COAL PREPARATION—R. H. Hughes (left), Clinchfield Coal Corp., session chairman; John Griffen, McNally-Pittsburg Mfg. Co.; H. G. Hague, Fraser & Chalmers Engineering Works, Erith, England; A. C. Richardson, Battelle Memorial Institute; William C. McCulloch, Roberts & Schaefer Co.; and E. T. Powell, Susquehanna Collieries Div., M. A. Hanna Co.

of mine surveying and general engineering is counted as practical experience. Thus all college graduates are urged to seek certification after 2 yr of employment, part of which time they have spent as instructors for non-engineering graduates. However, the company usually waits for the young engineer to express a wish for transfer to operating before such change is made. If the young man asks for the transfer, he is assigned as unit foreman or assistant mine foreman and is encouraged to work his way up from that position, exposing himself all the way to the wide variety of mining problems and learning to attend to details that some college men are inclined to overlook.

Responsibility for the young graduate engineer's training rests with his immediate superior. To speed this training and give the graduate a wider grasp of mining techniques, he attends general staff meetings held weekly in each district for all supervisors, where open-forum discussions broaden his information, encourage him to think independently and indoctrinate him in company policy.

Helps in Supervisory Training—Citing the many small enterprises that make up the coal industry and the difficulty of organizing an industry-wide training program, Professor Walker offered some suggestions that might help fill the need for skilled supervisors. His suggestions included the following:

1. Speed certification of engineering graduates by waiving some practical mining requirements in lieu of college training.
2. Broaden the use of such extension courses as are offered by the University of Illinois in mining.
3. Expand high-school courses in mining to recruit youngsters, make them better workers and help them advance.

4. Adapt present extension courses

in general supervision to fit coal's needs.

5. Establish more vocational trade schools for training in coal and add coal-mining to curricula offered by schools now existing. Establishment of a prototype school might well be undertaken by the Educational Division, BCI.

6. Provide training and opportunity within the company for advancement of college graduates.

7. Seek out young men who have intellectual competence, personality and human-relations skill and a desire to learn, lead and get ahead; and give them a climate in which their leadership qualities can grow.

8. Rotate young men through a variety of jobs to broaden their experience and orient them to the personnel, organization and policies of the company.

9. Follow through to see that these men get along well and are pleased with their outlook.

Courses for Future Foremen—"The rate of increase in the demand for supervisors has exceeded the rate of their development until today there are just not enough capable men for the jobs available. . . . Present trends point toward even smaller production-crew units and corresponding increase in the supervisory needs," Professor Spindler said.

Primary requirements of a good supervisor are job competence, leadership ability and sound personal attitude, he declared. Training of future supervisors should be directed toward these ends. They must know the technical and practical aspects of mining, contract provisions, company policies, state and federal laws, teaching techniques, mine management, cost accounting and psychology. Added to

all this, the prospective or actual supervisor must be ambitious and willing to sacrifice to achieve his goals.

Forward steps in supervisory training have been made in recent years. Among these, Professor Spindler listed coal-mining vocational training in high schools in several states; broadened curricula at the college-engineering level to include a wide variety of subjects; company-sponsored indoctrination programs to bridge the gap between academic training and operating practice; company-conducted conferences and training programs to improve the general quality of supervision; and university extension courses, broadened and updated year by year and employing the most modern teaching aids.

Commenting on the addresses on supervisory training, M. D. Cooper, director, vocational training and education, National Coal Association, and chairman, AMC floor committee, reported that college teachers are eager to cooperate with coal men in designing courses that will meet the needs of modern coal mining. However, coal's greatest opportunity for educational cooperation is in the high schools, he contended. Employment of young men from high schools and colleges is the industry's responsibility and if coal fails in this responsibility, it will have to accept the youngsters other industries do not want.

W. C. Nelson, Island Creek Coal Co., added that training always is going on, whether organized or not. This being true, a company ought to step in where it can direct the training. Careful selection of supervisory timber is essential but could be improved by devising suitable tests and standards.

and field experiences indicate the contrary, thus showing the limitations of the elastic theory.

"Elastic theory," he said, "tells us where a structure may start to fail but pure theory is not yet available to tell us how the structure failure will progress or what its final form will be." Full-scale field-test units for each mining district working with well equipped laboratories and a research staff of mining background would contribute to the welfare of the mining industry.

Pinning With Wood—Wood pins are supporting over 5,000 lineal feet of roof in Rio Verde (Green River) mine of the Norton Coal Corp., Nortonville, Ky., said Sterling S. Lanier Jr., president. Corrosive water from the roof puts definite limitations on the use of steel for roof bolting. Wood pins 2½ in in diameter and 5 ft long, costing 20¢ each, are anchored at top and bottom by wedges in rotary drilled

holes. Conventional timbering, which has not been entirely successful in holding that type of roof, would have cost much more than the wood pinning. Further details are given in the article beginning on page 78 of this issue.

Tunnel Bolting—Roof bolting with 1-in steel slot-and-wedge bolts 5½, 6 and 6½ ft long proved an economical and efficient support and was responsible for a higher rate of driving a water-level tunnel through rock measures dipping 70 to 85 deg, said D. E. Ingersoll, division superintendent, Philadelphia & Reading Coal & Iron Co., Pottsville, Pa. Holes were drilled with wet percussion drills and at a 60-deg angle to cut about straight across the measures.

Nuts were tightened with a Chicago Pneumatic Power Vane impact wrench to readings within specified limits. When check readings were made two months later, 27% showed no change, 37% gave a greater reading and 36% a lesser reading. The bolts have been in place since September, 1949. Tunnel width is 14 ft. A row of three bolts (4-ft centers) was installed for each 4 ft of tunnel advance.

TCI Program—Among the advantages credited to the company's roof-bolting program by E. H. Stevens, project engineer, Tennessee Coal, Iron & R.R. Co., Birmingham, Ala., were: (1) tonnage of all mines increased, (2) improvements in many directions in safety, (3) lower direct costs for timbering, (4) elimination of resetting of timbers and (5) improvement in the quality of both coal and ore. Over 5,000,000 sq ft of roof, equivalent to about 50 mi of entry in the TCI mines, is now bolted.

The TCI standard is based on 1-in steel bolts with 6-in wedge slots at the top and 5 in of cut threads at the bottom. In the coal mines the bolts are 30, 36 and 48 in long and are installed vertically. Several failures have occurred in the ore mines but only two in coal. TCI began experiments with roof bolts in 1948. Drilling is done with stoppers using tungsten-carbide bits on ¾-in octagon alloy-steel rods. Many tests, including pulls on the bolt anchorages with a hydraulic jack, were made before the present standard was arrived at.

Bolting Considerations—"Roof bolts," said Edward Thomas, chief, Roof Control Section, U. S. Bureau of Mines, "are not 'sky hooks' and they do not eliminate the weight of the roof; they merely change the distribution of stresses. The roof beam still requires adequate support at the abutments." Other conclusions were:

"The load-carrying capacity of any beam is limited. Consequently, if a bolted roof (beam) will support a span of 25 ft, it may fail if this width is exceeded.

"Unless it is intended to install bolts with proper supervision and

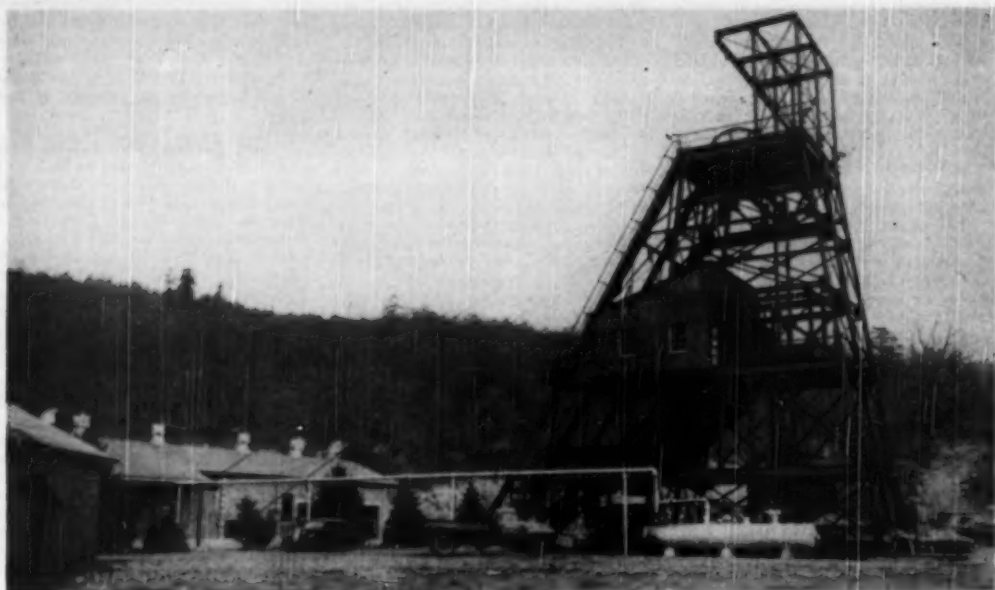
(Continued on page 162)

Bolting for Roof Control

THEORY OF ROOF BOLTING, application in thin and pitching seams, use of wood bolts, safety factors in roof bolting and mechanical equipment for various mining conditions were topics of papers read at the Monday afternoon session, Frank G. Smith, vice president, Sunday Creek Coal Co., Columbus, Ohio, presiding.

Elastic Theory—Yielding supports are desirable between the nut and roof to allow for a roof deflection of one-half the calculated safe deflection where the immediate roof consists of beds of fair thickness under strong overweight, declared P. B. Bucky, professor of mining, Columbia University. In one group of roof structures, available elastic theory and mathematical concepts can be used to calculate maximum span, bolt length, spacing and so on. In another group, in which those theories and concepts indicate roof bolting would not be practical, laboratory barodynamic tests

ANTHRACITE



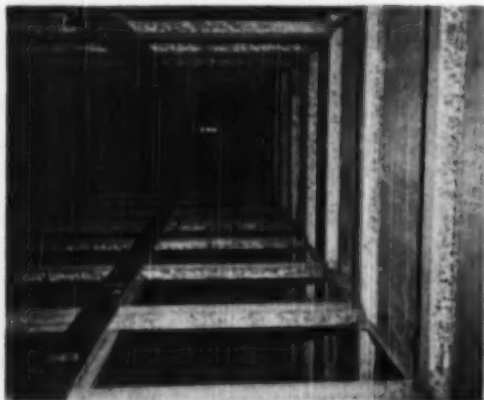
MERRIAM SHAFT surface facilities include engine room, compressor station, shop, offices, lamphouse and washroom in the new building at left. Rock produced in development work is hoisted here for truck disposal at present.

Development in Rock and Slant Chutes in Mammoth Vein Mark . . .

Pitch Mining At Raven Run

Faster Development Results From New Shaft Near
Center of Solid Reserves—Slant Chutes in Mammoth
Point to Higher Production and Increased Safety

THREE MAJOR PROBLEMS faced management of Jeddo-Highland Coal Co., Jeddo, Pa., on re-opening Germantown Colliery near Ashland, Pa., in 1943, and extending its limits thereafter. These



WATERTIGHT AND FIRE-RESISTANT MAIN SHAFT has two hoisting compartments and a half-compartment for utility lines.



MAIN TUNNEL is third-level opening to all veins. An overcast airway above this tunnel carries air to thin veins.

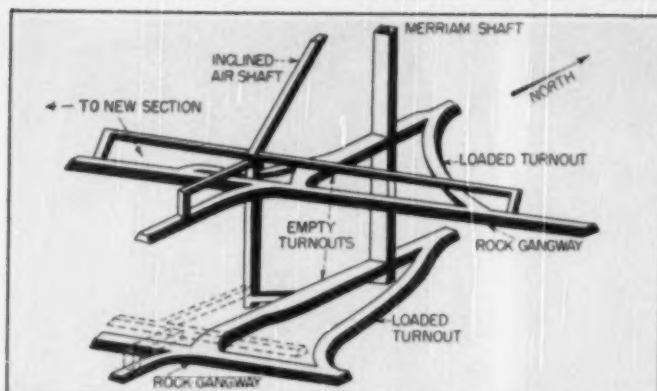


FIG. 1—ROCK OPENINGS at the new shaft are driven and maintained for long-term operation. This perspective shows the third and fourth levels behind the Mammoth vein.

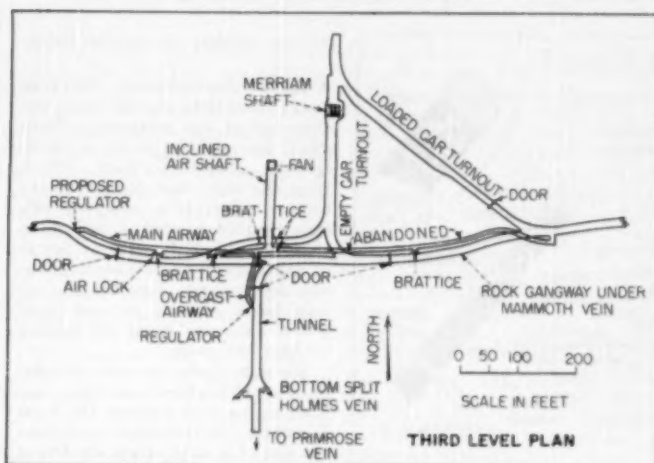


FIG. 2—MAIN AIRWAYS are of sufficient length to permit installation of automatic-door airlocks in gangways to prevent short circuits between main shaft and airshaft.

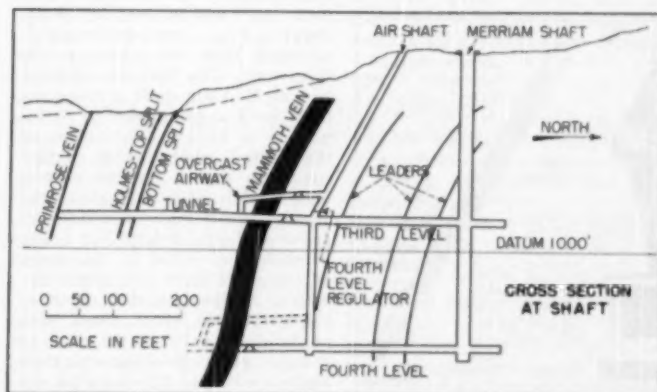


FIG. 3—OVERCAST AIRWAYS, joining the main tunnel after piercing the Mammoth vein, supply air to workings in overlying beds. Dotted lines show proposed openings.

three problems were: safe recovery of anthracite from steeply pitching veins; dewatering Germantown and adjoining Bast mine, both of which had not been operated for an extended period; and speeding development in a new section of the long narrow property.

To meet the major problems, company officials decided to adopt the slant-chute method of mining the Mammoth vein, employ deep-well pumps to dewater the workings and handle subsequent inflow, and sink a new shaft to speed development of the solid coal at the west end of the property.

Germantown is operated by Raven Run Coal Co., a subsidiary of Jeddo-Highland, and consists of Locust Run, Germantown and Merriam sections from east to west. The property is 25,500 ft long and the coal measures dip from 60 to 90 deg. The veins strike east across the Northumberland-Columbia county line and the new section in the western half of the property includes the Mammoth, Holmes and Primrose veins.

● Water Problem Takes Priority—

Germantown and Bast mine, operated by different companies before both were taken out of production, are separated by a dam in the connected opening underground. During the shutdown period, water rose to a height of 220 ft over the dam on the Germantown side and 95 ft over the dam on the Bast side. Impounded water exceeded 200 million gal, and this had to be removed because the condition of the dam was unknown. Three boreholes were drilled to a Diamond vein airway in Bast and three 2,500 gpm Pomona deep-well pumps were installed to remove the water and keep it well below the level of the dam. A complete description of the installation appears in *Coal Age*, August, 1944.

At present the company prevents considerable surface run-off from entering the mine by a system of ditches and flumes on the high side of strip openings and crop caves. The water is carried across the openings in flumes to discharge into surface streams. The magnitude of the water problem is apparent from the fact that approximately 7 mi of mountainside must be drained by Raven Run's drainage system to keep water out of Germantown. Pumping estimates indicate that 17 tons of water is removed from the workings for every ton of coal produced. A total pumping capacity of 12,500 gpm is maintained through-

Systematic Rock Development — Key to Consistent Coal Production



COAL GANGWAYS are driven in thin veins. Z. Yablonski (left), and F. Konecki load out coal before taking rock for width.



STEEL MINE CARS are hauled by battery locomotives to rock gangways, then by trolley locomotives to Buck Mountain Slope.

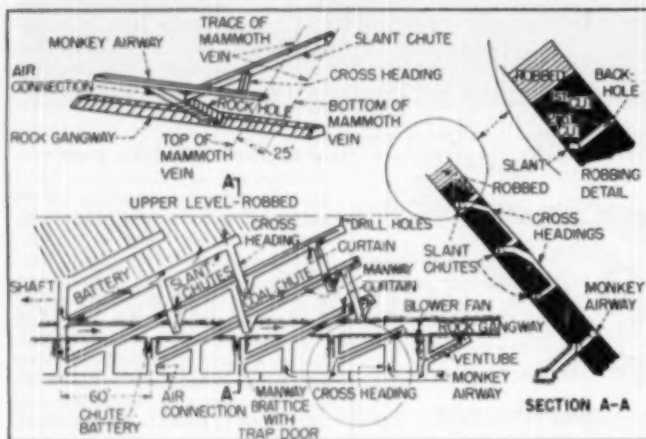


FIG. 4—SLANT CHUTES in Mammoth vein permit safer recovery and greater production. Every fifth slant is open to surface or upper level to limit places on one air current.

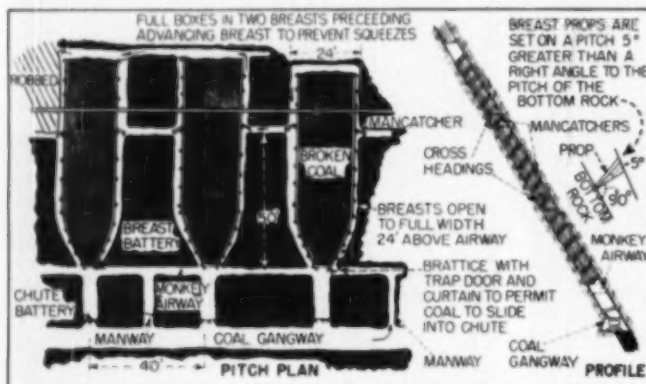
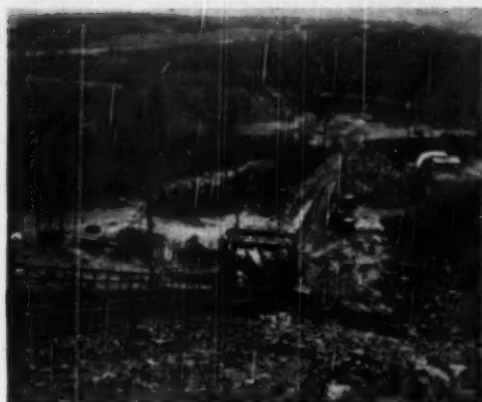


FIG. 5—MANGCATCHERS at every crossheading in thin seams prevent men and materials from sliding down the pitch. Two men work each breast from the pile of broken coal.

out the colliery to handle water.

• **Rock Development Governs Coal Production**—Solid coal in the west end of the reopened colliery would be recovered slowly if development gangways were driven from the older east section of the colliery. Therefore, company officials decided to sink a new main shaft and airshaft west of center of the colliery to accelerate gangway development. Now three gangway faces advance on each level where only one could be worked without the shaft.

Merriam shaft, the new concrete-lined steel-timbered opening, was sunk in the rock between the Buck Mountain and Mammoth veins near the site of a slope originally driven in 1858. In 1861 the slope collapsed, and no further deep mining was done in the area until the present operation was started. The main shaft and inclined air shaft, shown in Fig. 1, were driven simultaneously from the surface to the third level. The first underground level at Merriam shaft is called the third level to correspond to designations in Locust Run section of the colliery, where higher surface elevations permit mining at two higher levels. The main shaft was stopped at a depth of 277 ft, or 22 ft below the third level, but a 6-in borehole was drilled in the center of the shaft from this temporary bottom to the projected depth of the fourth level, 441 ft. Total depth of the shaft is 456 ft, the lower 15 ft being sump. Hoisting equipment and a headframe were installed and development of the third level, as described later in this article, was begun immediately.



BUCK MOUNTAIN SLOPE also handles strip coal that is hoisted on surface track after short rails bridge the slope mouth.



HIGHEST POSSIBLE RECOVERY is obtained by stripping, then driving underground workings to break out in the strippings.

The air shaft was turned to vertical at the third level and sunk to the fourth level. A bucket hoist was installed at the third level to handle the rock produced in sinking the air shaft, and this rock was transferred to the main shaft for surface disposal. A 5x8-ft opening was driven from the foot of the completed air shaft to a point on the fourth level directly below the main shaft. This opening tapped the borehole previously drilled, thus completing a ventilation circuit for the fourth level.

The borehole also served as a guide to the 5x7-ft chimney that was raised from the fourth to the third level as the first step in completing the lower section of the shaft. The final step was sinking the shaft around this chimney by dropping excavated rock into the chimney. Loose rock in the chimney was drawn off at a fourth level only fast enough to make room for the rock produced in the next cut. Thus, there was no danger of shaft men falling down the hole. A track-mounted buggy on the fourth level carried the rock buckets to the air shaft for hoisting.

This plan permitted development on the third level to proceed while the lower section of the shaft was completed. In fact, it permitted fastest possible development on both levels.

In developing the levels, rock tunnels were driven south from the main shaft to pierce the coal beds. Rock gangways open east and west off these tunnels under the Mammoth vein and follow the meanders of the vein so that a 20- to 40-ft interval is maintained between the gangway and the bottom of the coal.

Coal gangways are turned off main tunnels into the thinner veins, and bottom rock is lifted in these gangways to provide full width. Roof is usually self-supporting in rock openings but three-piece timber sets with close overhead and rib lagging are used in coal gangways.

Main airways also are driven through rock parallel to the rock gangways as shown in Fig. 2. The mine is pressure ventilated, so main airways are driven a sufficient distance to make room for airlocks on the gangway, thus preventing ventilation short circuits to the shaft. The airway joins the gangway beyond these airlocks. Crosscuts are driven between gangway and airway on 100-ft centers as development proceeds.

Overcast airways are driven through rock above and parallel to the main tunnel to carry air to the overlying veins. These airways pierce the Mammoth vein and then join the main tunnel, again leaving enough room for the airlock in the tunnel between this air opening and the gangway, as in Fig. 3.

The rock force also drives rock holes up from the rock gangway on an angle of 45 deg to tap the Mammoth vein. This rock is shot into the gangway in 6-ft cuts and loaded into cars by the mucking machine as it advances to load out the face cut. Rock holes are opened on 60-ft centers.

All rock work at the mine is done on contract and over 9 mi of rock opening have been driven since the mine was reopened.

Cleveland drills on track-mounted jumbos and Hercules and du Pont explosives are used in cutting rock. Compressed-air distribution is com-

pletely systematized to keep the number of pipe sizes to a minimum, save pipe through planned arrangement of mains and branches and keep air pressure at the face up to effective levels.

Rock-loading equipment includes two air-operated Elanco loaders, two Conway electric shovels, one air-operated Sullivan loader and two Sullivan drag scrapers for spot use.

The company has 300 solid-wheel all-steel mine cars equipped with Timken roller bearings and Ohio Brass automatic couplings. Level capacity of each car is 153.75 cu ft.

The solid-wheel feature has resulted in appreciable savings on repairing flat wheels. Forgotten sprags in the older spoked wheels caused the wheels to slide and flat spots had to be built up periodically. Now blocks are used to hold cars where necessary and flat wheels are no longer a problem.

The importance of keeping rock work up to schedule is indicated by the fact that every foot of rock advance frees approximately 14 cars of coal for ultimate production, company officials estimate. Present rate of rock advance is approximately 60 ft per day.

Plans for a fifth level at Merriam shaft are progressing. This level will open the coal down to the axis of the basin.

• Coal Recovery Keyed to Safety—Previous mining in the Mammoth had been done on the breast-and-pillar system but the new section at Merriam shaft uses the slant-chute system for greater safety. Steep pitches made supply handling and traveling difficult and danger-

ous under the old system. Now, all main coal openings are driven on 35 deg, since this inclination is best for permitting coal to run without excessive degradation.

The 25-ft-thick Mammoth vein is entered by two-man crews from the rock holes previously mentioned. Their first operation in coal opens a ventilation connection to a monkey airway along the top rock parallel to the strike. This air connection is in line with the rock hole. The monkey airway is extended by turning the air connection against the top rock and driving back to the existing portion of the monkey airway.

After the air connection has been made, the men return to the intersection of the rock hole and the bottom of the coal to drive the main 5x8-ft slant chute. They drive the slant on a 35-deg inclination through coal along the bottom rock in the direction of mining advance. A coal runway on the bottom-rock side of the slant and a manway on the opposite side are separated by a plank curtain that confines the coal and controls ventilation.

Crossheadings are driven on 50-ft centers. Level openings are driven off adjacent slants for about 8 ft and crossheadings are driven to these openings to eliminate the possibility of driving a crossheading into the coal runway in the slant. Fig. 4 illustrates these openings.

Pillar recovery is started as soon as it is determined that robbing will not endanger the miners in adjacent slants. Robbing is begun by driving a backhole to the top rock 25 ft back from the face of the slant, thus outlining a prism of coal for recovery. From a point midway in this hole, the top half of the prism is removed by drilling, shooting and loading out enough of the coal to cause the rest to drop. The bottom half of the prism is removed in a similar manner from the intersection of the slant and backhole. The two-man crew then retreats 25 ft down the slant to start a new backhole to the top rock. Pillar recovery proceeds in such 25-ft steps to the stumps along the tops of the rock holes.

The use of slant chutes in mining the Mammoth has resulted in increased safety, as mentioned earlier, and also in higher recovery per man-shift. Production per man-day has risen approximately 25% under the new system.

Holmes and Primrose veins, thinner than the Mammoth, are still mined by breast-and-pillar meth-

ods. Breasts are driven 24-ft wide on 40-ft centers up the pitch from the monkey airway by two men and are opened to full 24-ft width about 24 ft above the monkey airway, as shown in Fig. 5. Crosscuts on 50-ft centers provide ventilation paths between breasts. Excess coal that will not fit in the box is run down the chutes to the car in the gangway. The men work from the top of the pile of broken coal in the box.

"Mancatchers" are constructed at each crosscut to prevent men from sliding all the way down long breasts. These safety devices consist of planks across the manway at each crosscut so that sliding men or objects will be deflected into the crosscut. Advancing breasts are protected from squeezes by keeping full boxes in two breasts preceding the advancing breast.

Coal is not hoisted in the new shaft at present, but is moved to the foot of a slope near the center of the colliery. This slope follows the Buck Mountain and Buck Mountain leader veins to the surface. The cars are end-dumped into gunboats at the foot of the slope and the gunboats discharge to a surface tippie for picking, screening and reduction of oversize to minus 6-in lump. This coal is shipped over a spur of the Lehigh Valley R. R. to Midvalley breaker of the Hazle Coal Co., also a Jeddo-Highland subsidiary. Here the mine product is processed to standard anthracite in Chance cones and Wilmot Hydrotators at the breaker.

The gunboat slope is arranged to carry strip coal to the tippie over surface track that can be used when bridge rails are dropped over the mouth of the slope. The underground loading point at the foot of the slope and the surface loading point are equal rope distance from the tippie.

● **Pressure Fans Provide Positive Ventilation**—Three Jeffrey Aerovane fans force 450,000 cfm of air at 1.7-in wg into the workings. Each fan is assigned a definite length of property and ventilates all beds in that section as separate splits.

At Merriam shaft, the fan forces air down the inclined air shaft and into the main tunnels behind automatic-door airlocks that prevent ventilation short circuits to the main shaft. Airlocks in the positions shown in the accompanying illustration consist of pairs of automatic doors operated by the weight of the rolling stock as the first car

depresses a treadle rail near the door. A system of levers operated by the treadle rail opens the door. Each door is equipped with American Mine Door alarms that announce the approach of a trip within 500 ft of the door. This safety device tends to eliminate the possibility of injury inherent in quick-opening automatic doors.

Air enters the Mammoth through the rock hole of the advance slant and is carried back through the crossheadings to outby slants. Every fifth slant is opened to the upper gangway or the surface so that not more than five slants are served by one current of air. The monkey airway is connected to all robbed slants; consequently, many openings are available and robbed areas are swept by the air before it exhausts. Robbed slants are blocked on the gangway to control air coursing in the coal openings.

Thinner beds are similarly ventilated, air entering the breasts from the gangway at the advance breast and exhausting through the monkey airway or through breasts driven to break through to the surface or the upper level gangway.

Auxiliary blower fans and tubing insure adequate air in advancing openings until such openings tap regular airways.

● **Auxiliary Services**—Power is purchased from Pennsylvania Power and Light Co. at 23,000 v and stepped down for use in the new section at a substation near Merriam shaft. Underground equipment, except trolley-powered locomotives, operate at 440 v ac. The locomotives use 275 v dc provided by a 200-kw motor generator set on the surface. Gathering is done by four battery-powered locomotives in coal gangways, thus eliminating trolley wire. Eight trolley-powered locomotives are used for main-line haulage and in rock gangways.

Operating supervisors at Raven Run are Michael Wascovich, division superintendent; Donald Markle, Jr., assistant division superintendent; and John A. Novatnak, mine superintendent.

Safety promotion is the responsibility of John Eidelman, full-time safety supervisor at Germantown, under direction of M. W. Price, Jeddo-Highland's safety engineer.

Donald Markle is president of the parent company; C. A. Garner, vice president in charge of operations; W. C. Jones, general superintendent; and G. H. Holland, chief mining engineer.

Table 1—Average Tons per Man per Day, Percentage Mined by Methods of Mining and Loading, and Value FOB Mine at United States Bituminous and Lignite Mines, 1943-48

	1943*	1944*	1945†	1946	1947	1948
Strip mines	15.15	15.89	15.46	15.73	15.93	15.28
Underground Mines:						
Using loading machines only—90% or more of output mechanically loaded	...	...	...	7.29	7.22	6.84
Using loading machines only—less than 90% of output mechanically loaded	...	...	...	5.16	5.20	4.75
Using conveyors only—90% or more of output mechanically loaded	...	...	...	4.59	4.63	4.34
Using conveyors only—less than 90% of output mechanically loaded	...	...	...	4.55	4.39	4.04
Using both loading machines and conveyors—90% or more of output mechanically loaded	...	...	...	5.62	5.31	4.94
Using both loading machines and conveyors—less than 90% mechanically loaded	...	...	...	4.68	4.70	4.45
Total—90% or more of output mechanically loaded	6.62	6.60	6.49	6.72	6.59	6.26
Total—less than 90% of output mechanically loaded	4.61	4.56	4.48	4.92	4.89	4.50
Total	5.49	5.53	5.51	5.89	5.86	5.57
100% of output hand loaded	3.97	4.15	4.10	4.42	4.58	4.60
Total, underground mines	4.89	5.04	5.04	5.43	5.49	5.31
Grand total, all mines	5.38	5.67	5.78	6.30	6.42	6.26
Per cent of total production mined by stripping	13.5	16.3	19.0	21.1	22.1	23.3
Per cent of underground production mechanically loaded	48.9	52.9	56.1	58.4	60.7	64.3
Per cent of underground production hand loaded	51.1	47.1	43.9	41.6	39.3	35.7
Average value, fob mines, per ton:						
Strip mines	\$2.28	\$2.48	\$2.65	\$2.87	\$3.47	\$4.11
Underground mines	2.75	3.01	3.16	3.59	4.35	5.26
Total, all mines	2.69	2.92	3.06	3.44	4.16	4.99

*Tons per Man Raised by Use of Machines at Bituminous Mines. W. H. Young and R. L. Anderson, *Coal Age*, April, 1946, pp 105-108. †Supplement to W.C.R., No. 1546, pp 6-7, R. L. Anderson. ‡Not available.

How Bituminous Mining Has Fared Machine-Wise

Stripping and Mechanized Mining Grow, But Tons per Man-Day Drop in 1948—Hand Loading Holds up Best

By W. H. YOUNG, Chief, Bituminous Coal Section, and R. L. ANDERSON, Engineer-Economist, Bureau of Mines, Dept. of the Interior, Washington, D. C.

STATISTICS on bituminous production and mine operation, as collected by the U. S. Bureau of Mines, do not make possible separating productivity according to underground tonnage loaded mechanically and by hand because of the inability of the producer to allocate employment.

A separation has been made, however, that provides over-all productivity for the following groups of mines:

1. Strip mines.
2. Underground mines using loading machines only.
3. Underground mines using conveyors only.

Not subject to copyright.

4. Underground mines using both loading machines and conveyors in the same mines.

5. Underground mines without loading devices (100% hand-loaded).

The underground mines using mechanical-loading devices—Groups, 2, 3 and 4—were further subdivided into two groups:

A. 90% or more of the output mechanically loaded.

B. Less than 90% of the output mechanically loaded.

The five groups previously listed take in all bituminous and lignite mines producing 1,000 tons or more annually. Table I summarizes the data for the period 1946-48, inclu-

sive, with a general summary for 1943-48.

• **Productivity Base**—Productivity was based on the three following items:

1. Total production of usable coal.
2. Average number of men working underground and on the surface on active days, including foreman and supervisors but excluding office employees, coke workers, and employees in stores or affiliated industries other than the production of coal.
3. Total number of days mine was active during the year.

"Loading machines" include mobile loaders, continuous miners (1948 only), scrapers, and conveyors equipped with duckbills or other self-loading heads. "Conveyors" include hand-loaded conveyors and pit-car loaders.

In comparing "tons per man per day" for the years 1943-48, it must be remembered that changes were made in hours worked at mines un-

How Mechanical Loading and Stripping Have Grown Since 1943

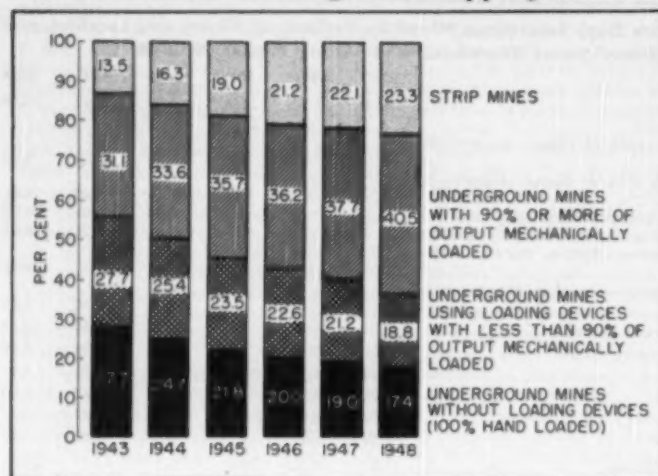


FIG. 1—PERCENTAGE of bituminous coal and lignite produced in the United States by methods of mining and underground loading, 1943-48.

der union contract during this period. The 7-hr work day was lengthened to 8 hr (8¼ hr portal-to-portal) Nov. 3, 1943. This 8¼-hr portal-to-portal schedule was changed to 9 hr portal-to-portal April 1, 1945, continuing to July 1, 1947, when the hours were reduced to 8 portal-to-portal. This rate still is in effect today.

• Production by Types of Mining

—Fig. 1 shows the percentage of bituminous coal and lignite produced by methods of mining and underground loading in the period 1943-48. Productivity data in Table 1 were computed from the same tonnages used to calculate percentages in Fig. 1.

The percentage of underground production mechanically loaded and the figures for hand loading in Table 1 relate to actual tonnage mechanically or hand loaded and not to total production at mines using mechanical or hand loading, as used in productivity data. For example, Fig. 1 shows that 17.4% of the total output in 1948 was produced at mines with 100% hand loading, while 27.4% of the total (35.7% of the underground production) was actually hand loaded.

There were 9,079 active bituminous and lignite mines in the United States in 1948, subdivided as follows:

Strip mines, 1,971.

Underground mines without mechanical-loading devices (100% hand loaded), 5,753.

Underground mines with loading devices, 1,355, in three groups:

A. Using loading machines only, 769.

B. Using conveyors only, 349.

C. Using both loading machines and conveyors, 237.

It should be remembered that loading devices generally are installed in the larger mines. In 1948, 1,335 mines producing over 100,000 tons each accounted for 77% of the grand-total production.

• Productivity by Mines—Fig. 3

shows productivity data for selected underground and strip mines in 1948. The 100% hand-loading mines show 4.60 tons per man per day, which is only 1.66 tons less than the underground mines with 90% or more mechanical loading. This difference was 2.65 tons per man per day in favor of mechanical loading in 1943. Is mechanical loading approaching the saturation point?

Although productivity at mines with 100% hand loading showed a greater increase than the mines using loading devices in the period 1943-48, the production at these hand-loading mines decreased about 60,000,000 tons, while production at mines with mechanical loading increased 9,000,000 tons. The tonnage that shifted from "100% hand-loading mines" to "mines using mechanical-loading devices" increased from 3.97 to 5.49 and 4.60 to 5.57 tons per man per day from 1943 to 1948, respectively. Mines will continue to add mechanical-loading equipment as long as it is economically feasible.

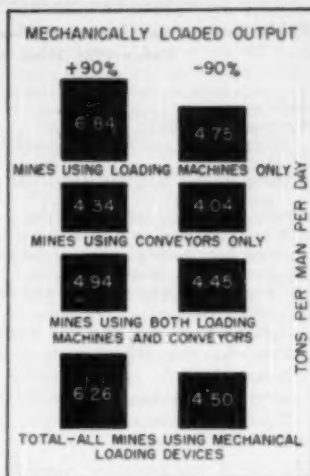


FIG. 2—AVERAGE TONS per man per day at bituminous mines using mechanical-loading devices by type of loading in the United States in 1948.

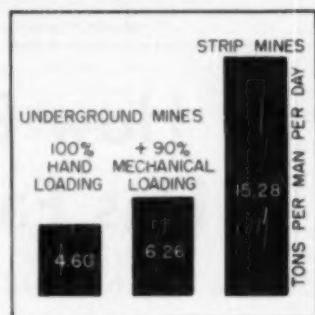
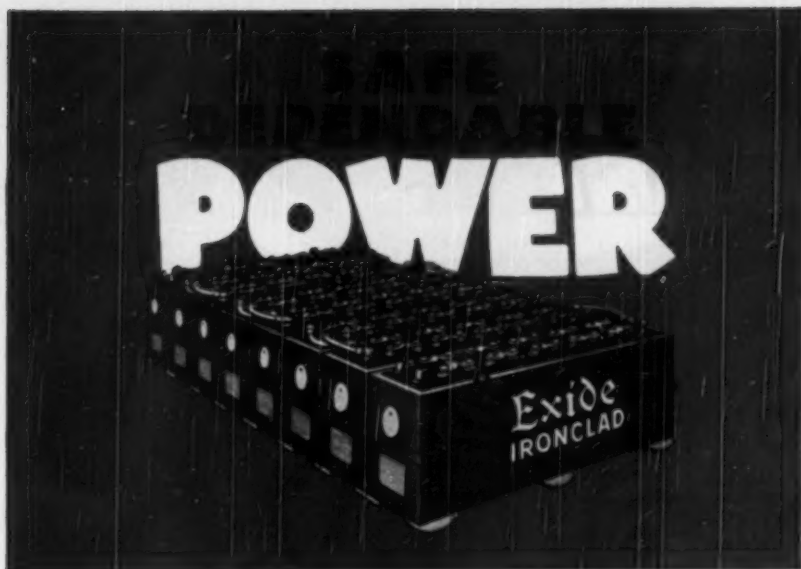


FIG. 3—AVERAGE TONS per man per day at bituminous mines by methods of loading at selected deep and strip mines in 1948.

Average tons per man per day at underground mines using loading devices by type of loading in 1948 is shown in Fig. 2. The mines that load less than 90% of their output mechanically have lower productivity rates than those that are completely mechanized. This is to be expected, because most of the mines in this group (less than 90% mechanically loaded) are either just beginning to install mechanical loading or the physical conditions in the mine are not adapted to complete mechanization.

Detailed data on production and tons per man per day by methods of mining and loading at bituminous and lignite mines, by states and districts, 1946-48 inclusive, will be published by the Bureau in a Weekly Coal Report.



Get instant starting and rapid acceleration with

Exide-Ironclad Battery POWER

Your battery-powered haulage units will be fast moving when powered by Exide-Ironclads. That means you get more trips per shift, more production per man per hour... at less cost per ton handled. Also, Exide-Ironclads provide:

- High power ability—they can discharge, without harm, at many times their rated capacity.
- Large reserve power for all normal and emergency needs.
- Safe haulage—the only kind permitted in gaseous mines.
- Full shift availability, with as much tonnage moving during the last hour as during the first.

- Flexibility—quick car changes, less idle loader time, steadier main-line operations.
- Low costs of operation, maintenance, depreciation, repair.
- Exceptionally long life, proved in more than 100,000 heavy-duty jobs.

Combined, these and other outstanding characteristics assure you that...

Exide-Ironclad Batteries are the Best Power Buy... AT ANY PRICE

THE ELECTRIC STORAGE BATTERY CO.

Philadelphia 32

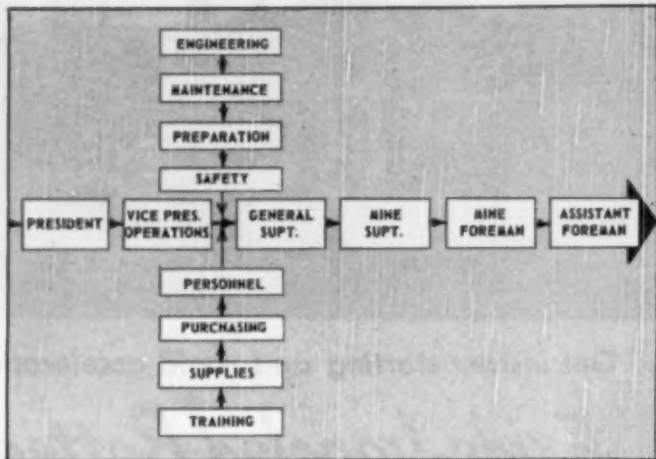
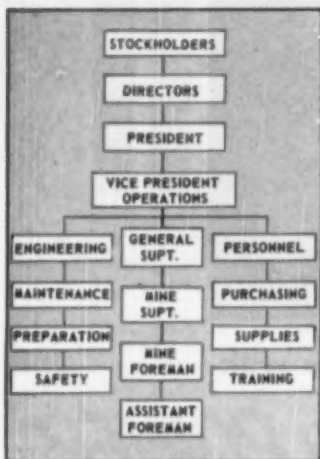
Exide Batteries of Canada, Limited, Toronto

"Exide-Ironclad" Reg. Trade-mark U. S. Pat. Off.

1888...DEPENDABLE BATTERIES FOR 62 YEARS...1950



The Foremen's Forum



NOT LOW MAN . . .

BUT PRODUCTION SPEARHEAD, a foreman must show . . .

Leadership At The Face

How You Plan and Think Ahead in Doing a Job Has as Much Effect on the Outcome as Your Direct Bossing Duties — Systematize Your Planning and Thinking for Better Performance and Good Results

A FOREMAN looking at the supervisory organization chart (left) may get the feeling that he is "low man on the totem pole," but to quickly kill that feeling look at the other chart. Here the vertical arrangement has been changed to horizontal and the equal responsibility of all parties is illustrated. Now, instead of having everyone look down your throat, you have the full force of the organization behind you as you discharge your duties.

This presentation shows you in a key spot. You are the link between production and management, and a mighty important link. All information that your company staff gathers, all aspiration for profitable production and all necessary operating controls

are channeled through you to the men. Conversely, all dealings the men desire with the company are directed to you first, in the knowledge that you will know where to relay them.

Consider the company as one limb of an arch and your men as the other. You are the keystone and if you crumble the arch falls.

A different analogy may be drawn by likening your company to a military organization. It isn't our intention to compare mining to war but with modifications there is a resemblance, and we are making a point.

You have a primary company mission of taking coal from the face, and a military organization has a mission of defeating the enemy in combat.

The infantry, still the Queen of Battles in 1950 as throughout history, is supported by civilians at home and all other services, and the ultimate war aim is to place these foot soldiers in occupation of the enemy's homeland. Everyone promotes that aim from the production line at home, through successive battles, land, sea or air, to the final occupation in hostile territory.

Production men and their immediate supervisors are the infantry of coal mining, bless them. The desired end of the company's effort, profitable production, will not be attained until they reach the face and attack it effectively, and all other activities of the company merge to promote this end.

Of course the assistant mine foreman is the immediate superior of the men and that brings us to the point of investigating military training procedure to see if there is anything of value in a platoon leader's training that a mine boss can use.

One of the prime features of the training is development of planning ability and the knack of looking ahead



HAULAGE WAYS Jr.

Your Bolting Jobs Can Look Like This

On your next bolting job, use O-B Roof Support Expansion Shells and Plugs to get the greatest amount of headroom. Only the bolt heads will be exposed beneath the roof plate after the bolt is tightened. Your roof will look as slick and clean as the one shown above.

Bolts do not have to bear on the hole bottom when O-B Shell and Plug units are used. The hole is drilled to a greater depth than the bolt length, and there is no chance for bolt ends to protrude, as do the rods shown in the lower illustration. Rod ends

such as these rob you of valuable headroom, and they are a real hazard.

Since the O-B Roof Support Expansion Shell and Plug bears on the side of the hole, rather than the bottom, the bolt moves up into the hole as it turns in the plug. The result is a smooth, clean roof, with the greatest amount of unobstructed headroom.

If you are bolting, or are planning to do so, ask your O-B representative to explain the use of O-B Roof Support Expansion Shells and Plugs. He has a good deal of information to share with you.



Ohio Brass

MANSFIELD



OHIO, U. S. A.

CANADIAN OHIO BRASS CO. LTD. NIAGARA FALLS, ONT.

HAULAGE WAYS *Jr.*

Prove it for
yourself!



The first two illustrations show a workman hooking up his O-B Mobilidril and starting to drill a hole in the rail web.



Here the workman hammers a wedge into place in the hole, and picks up his equipment when the joint is completely bonded.

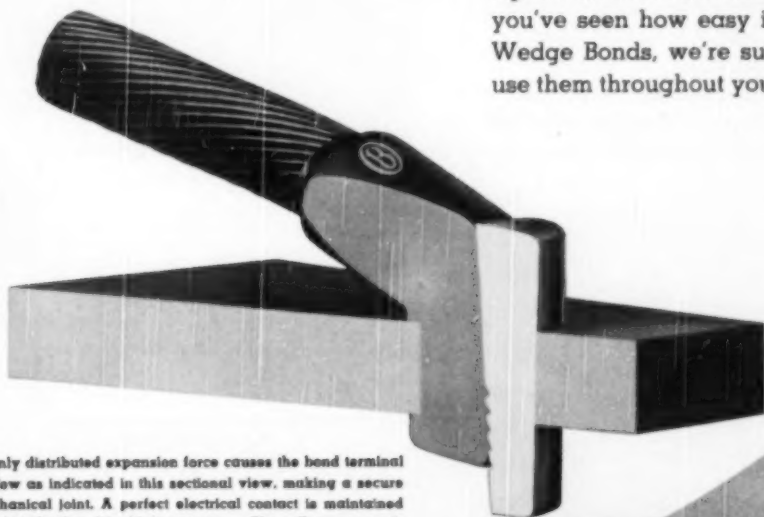
WEDGE BONDING

is faster!

● You can see rail joints in your own haulage system bonded in just about one minute. See how one of your own men is able to keep new track bonded with O-B Wedge Bonds as fast as it is laid. And seeing is believing! A demonstration of O-B Wedge Bonding will show how to make the fastest permanent bonds you've ever had in your workings. Next time bonding comes up for consideration, ask

an O-B representative to demonstrate the O-B Wedge Bonding method.

This bond is ideal for either permanent or temporary track. A few swift hammer blows on the wedge set the bond in the rail web with a pressure of 20,000 pounds, making a durable, lasting connection for main haulage use. On the other hand, they are easily removed from portable track and can be used over and over again. Ask for that demonstration! Once you've seen how easy it is to bond with Wedge Bonds, we're sure you'll want to use them throughout your mine.



Evenly distributed expansion force causes the bond terminal to flow as indicated in this sectional view, making a secure mechanical joint. A perfect electrical contact is maintained indefinitely by this high pressure. The all-copper path from terminal to terminal provides a conductor whose resistance averages ten per cent less than that of welded bonds of similar length.

Ohio Brass
MANSFIELD  OHIO, U. S. A.
CANADIAN OHIO BRASS CO. LTD. NIAGARA FALLS, ONT.

HAULAGE WAYS Jr.

Extra-Wide Gathering Range

O-B Automatic Couplers Have 50% Greater Gathering Range

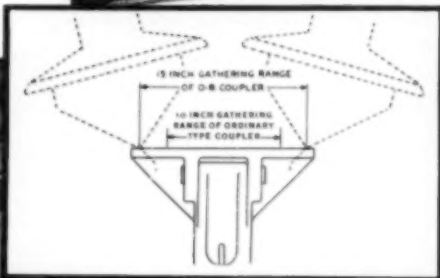
● Here's a coupler that lets you couple cars automatically on any normal haulage system curve. The extra-wide gathering range of the O-B Automatic Coupler, with male and female coupler heads, is 50 per cent greater than that of the ordinary automatic coupler in mine service. As shown in the small drawing, the two heads will couple when displaced as much as seven and one half inches on opposite sides of the center — for a total of 15 inches of gathering range.

In addition, the coupler heads have a vertical "pick-up" that allows automatic coupling of cars with a difference in coupler height of up to five inches. This is sufficient to take care of the breaks in grade and the normally uneven track conditions existing in mines.

By proper selection of type and length, the O-B Automatic Coupler can be used on practically any mine curve or grade condition. This is just

one good reason for making O-B Automatics your coupler choice. Talk it over with your O-B representative.

Mine cars couple automatically under normal curve and grade conditions. The sketch shows the increase in gathering range provided by the O-B Automatic Coupler.



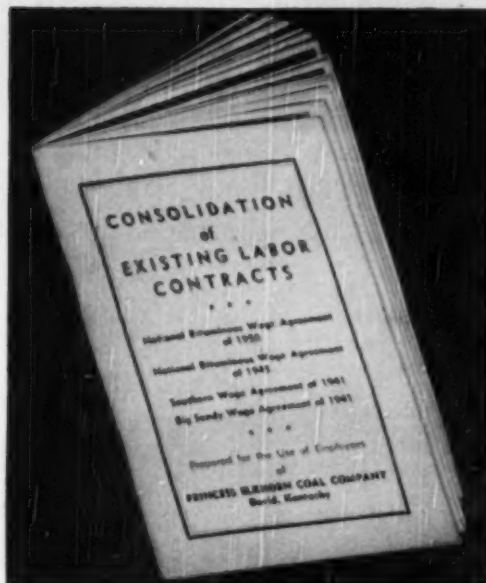
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Ohio Brass

MANSFIELD OHIO, U. S. A.

CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

Princess Elkhorn Nails Down The New Contract



A 1950 APPROACH to improved labor relations is embodied in a manual prepared for supervisors and workmen of Princess Elkhorn Coal Co., David, Ky., by Pace Wiles Advertising, Inc., Huntington, W. Va. The manual presents provisions of all bituminous wage agreements currently in force so that possibilities of misunderstanding will be reduced.

In sending the booklet to Foremen's Forum, D. L. Francis, president of Princess Elkhorn writes, "We plan to give each foreman a copy and to have classes and discussions on the contract with them, emphasizing those points which are most important in their supervisory realm."

"After the foremen have had an opportunity to digest these matters they will be given sufficient copies to personally hand one to each union employee working for them. It is our plan to have supervisors talk to the men about these subjects periodically over the next few weeks, stressing points important to ourselves and the men."

"We find that our foremen can handle these discussions very effectively if they take only 5 to 10 min at a time, and this insures better coverage than sending our employees a lot of written material that many of them probably would not read."

Mr. Francis continues, "We find from experience that a great many of our grievances would not have arisen if our employees had had a working knowledge of the contract. For a number of years they have not even had a copy of the various contracts, and we found that even committeemen were not familiar with them. Helping our men to gain a knowledge of the contract will eliminate many grievances caused by misunderstanding."

in preparing for any eventuality. The goal of the training is to teach potential leaders how to systematize thinking and planning. Let's look at his acquired system for receiving orders from higher up and applying them to his own unit, and then parallel this system with a similar one for mine supervisors by substituting mining elements for military elements.

His orders from superiors will permit him to complete this outline:

1. Time, date and location of operations.
2. Applicable maps of the area of operations.
3. Disposition of enemy troops.
4. Disposition of friendly troops.
5. Supply procedure.
6. Mission of next larger unit.
7. Assigned mission of own unit.
8. Line of departure.
9. Objective.

Whether he completes this outline in writing or uses it as a mental checklist depends on the size of the assigned job and the number of details involved. It is apparent that all elements bearing on the successful completion of his mission are included, and the information he gets from the completed outline permits him to intelligently estimate the situation and come to a sound decision to govern his actions.

As a mine supervisor you can also assemble such a framework to fully describe the job you are given by your superiors. It might include the following elements:

1. Time, date and location of the work to be done.
2. Applicable mine maps.
3. Character of the natural obstacles to be overcome and hazards that might defeat your successful completion of the job.
4. Men and equipment available to do the work.
5. Supplies—what you need, where you get it and how you get it.
6. Job assigned to your immediate superior.
7. Your assigned duties in the larger job given to your superior.
8. Where you start.
9. Where you stop.

One advantage in having such an outline to which all tasks can be tied is that it permits you to ask important questions at the time the work is assigned to you. You have complete information and you won't be caught at a great distance from advice with some forgotten detail giving you trouble.

Part of your outline can be completed from your own experience. However, much of the information must come from the special investigations your company staff makes on various aspects of the work, and you

get this information by asking questions to complete your job-analysis outline. Remember that a military leader leans heavily on the intelligence activities of his unit's staff.

Assume your outline is filled. How do you use it? The filled-in outline gives you all information necessary to examine the job, choose the better plans of operation, decide on the best one, issue orders to accomplish what you have decided to do and then supervise the work. Note the position of supervision in this sequence. All other factors must precede it, and your supervision will be more effective if you have a clear mental picture of the entire job.

Directing your men at the face does not require "bossing" ability only, but also planning and thinking ability. The combination of these abilities in one man identifies a leader, and leadership is as important in mining as in a military campaign or any other pursuit.

So-called "born" leaders are men who have a natural aptitude for applying these fundamental principles to complete a task. Other men can learn to apply these fundamentals, so leaders are also "made."

The leader is up front because he knows where he is going. He knows where he is going because he has made careful plans. As soon as he neglects planning he loses sight of the goal, and someone else steps to the front.

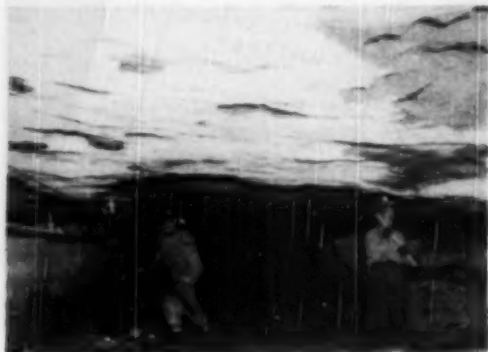
Operating Ideas



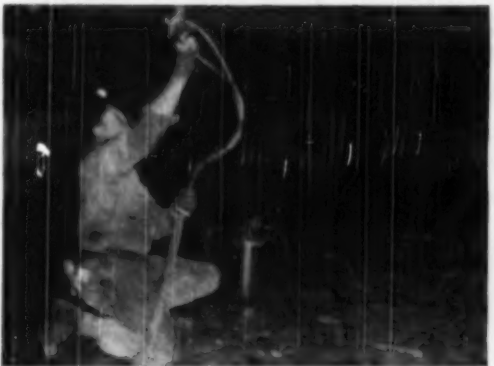
Red Jacket Tries Liquid Plastic to Prevent Roof Spalling



SPALLING caused by temperature changes has dropped a lot of roof in this crosscut as indicated by conditions at the cap pieces.



SCALING, brushing and blowing removes all loose material so that the best possible plastic-to-roof bond can be secured.



SPRAYING is done with regular pressure guns after plastic and thinner have been mixed in the pressure tank.



APPLIED PLASTIC may prevent the spalling hazard, and Red Jacket is going to find out by controlled experiment.

A NEW IDEA in roof coating to prevent spalling is being tried by Red Jacket Coal Corp., Red Jacket, W. Va., at Junior No. 9 mine. In a recent letter that emphasizes the experimental nature of the project, J. J. Plasky, training and safety director of the company, writes: "Four coats of liquid plastic were sprayed onto the roof to prevent spalling because of seasonal temperature changes. The liquid plastic is inflammable and has a pungent odor when wet so necessary precautions must be taken dur-

ing application. However, it dries quickly, and inflammability and odor decrease rapidly as it dries. Tests indicate that the applied plastic will not ignite after an elapsed drying time of 5 min. Adherence is excellent, but time alone will prove if it is successful in preventing spalling." Tests on the roof of a Texas gypsum mine had been reported as promising.

Liquid plastic, supplied by Liquid Plastic Coating Corp., Houston, Tex., was applied to 6,000 sq ft of mine roof after scaling, brushing and blow-

ing had removed all loose material. Cost of plastic and thinner amounts to approximately 11c per sq ft for four coats. Preparing roof for spraying required 20 man shifts, and spraying occupied two men for 32 hr. Previously, it was necessary to keep a crew of men trimming roof for 3,000 ft from the drift mouth during the summer months.

A later issue of *Coal Age* will carry a complete report of this roof control measure after Red Jacket officials appraise results of their experiment.

NEW EFFICIENCY FOR YOUR CHAIN CONVEYORS...

LONG *Superflite* CONVEYOR CHAINS



**More
Tonnage!**

Fewer Breakdowns!

LOOK AT THESE

Continuous Flow
FEATURES

BALANCED BLOCK LINK DESIGN

ASSURES

**BALANCED
STRENGTH!**



In Superflite L-60 chain, flight side bars and adjacent block links are heavier to successfully withstand eccentric loads and shocks, which are spread throughout the chain equally.

Stronger flights stay straight . . . run free! Exclusive double flange flight design (patent pending) is at least 300% stronger. Superflite flights can't bend because they will withstand far more stress than the shear pin.

Effective shear pin protection! Pins shear before obstruction causes damage to flights or any other part of the conveyor.

Fewer stoppages — minimum maintenance! Because Superflite flights do not bend, they maintain ample clearance and therefore can't jam the conveyor. This eliminates the "vicious cycle" of bent flights damaging pan joints which in turn bend more flights.

Premium grade materials—longer wearing parts! Only the finest material is used in Superflite chains to provide over 25% more strength. Side bars, pins and rivets are heat treated. Block links are highest quality heat treated alloy malleable castings. Flights have special broad wearing surfaces.

Exclusive double lock design! Double locked pin and rivet construction prevents premature wear caused by pins turning in side bars.

Superflite

CONVEYOR CHAINS ARE INTERCHANGEABLE ON ALL STANDARD 12" AND 15" TYPES AND ARE STANDARD EQUIPMENT ON LONG CHAIN CONVEYORS

Write for complete details
and demonstration

LONG SUPER MINE CAR CO., INC.

FAYETTEVILLE, WEST VIRGINIA

Manufacturers of new, improved chain conveyor equipment for modern mining



The only
compressed-air-tight valves
are valves designed for
compressed air



GRINNELL-SAUNDERS DIAPHRAGM VALVES

Invented by a mine engineer to stop air leaks. A rubber diaphragm seating on metal gives positive closure, even when scale is lodged on the weir. At the same time, working parts are isolated from the air lines so that no packing glands are needed, no stem leaks are possible. That was the idea behind the Grinnell-Saunders Diaphragm Valve. As one engineer said, "When about a third of your air compressors are just pumping air out through leaks and this diaphragm valve eliminates the leaks, cutting out one-third of your air costs, why you've really got something."



Diaphragm gives leak-tight closure against grit, scale, solid matter. The resilient diaphragm, plus the large area of contact, gives leak-tight closure against pressure or vacuum. You can't keep scale out of compressed air lines but tests prove that Grinnell-Saunders Diaphragm Valves give perfect closure when scale up to 1/6" diameter is trapped in 1" valves and up to 3/4" solids in larger valves.

No "freezing", no clogging, because all working parts are sealed off from compressed air and moisture.

Friction loss reduced by streamlined flow in both directions. Diaphragm lifts high to give unobstructed passage. Friction coefficient remains practically constant throughout range of valve sizes.



Inexpensive maintenance without removing valve from line. Diaphragm is only part that normally wears and needs replacement. Often lasts for years since compressor and finger plate support it in all positions. Quickly, easily replaced without removing valve from line. No refacing, no disc holder, no packing glands.



Self-financing through compressed air savings. This table from "Compressed Air Data Book" shows how fast you can pay for Grinnell-Saunders Diaphragm Valves out of the compressed air savings, and, perhaps, avoid the purchase of larger compressors.

Size of opening inches	Cu. ft. wasted per month at 100 lbs. pressure based on nozzle co-efficient of .65	Cost of waste per month based on 6 cents per 1000 cu. ft.
3/8	6,671,890	\$400.31
1/4	2,930,840	173.33
1/8	740,210	44.41
1/16	183,272	10.94
1/32	45,508	2.73

Diaphragms, body and lining material to meet all conditions. Bodies stocked in cast iron, malleable iron, stainless steel, bronze and aluminum (other materials on special order). Linings of lead, glass, natural rubber or neoprene. Diaphragm materials, natural rubber or synthetics. Write for the Grinnell-Saunders Diaphragm Valve Catalog.



GRINNELL

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Handy Items In Tool Bag or Pocket Ease Mine Maintenance

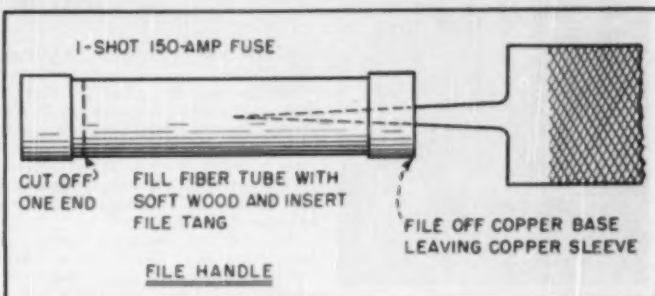
MAINTENANCE AIDS, illustrated here as submitted by E. C. Hitchcock, Summerlee, W. Va., are designed to help mechanics and electricians do clean, safe work on the small jobs that come up during the shift.

The file handle, made from a discarded 150-amp one-shot fuse cartridge filled with soft wood, will keep the file tang out of your flesh when you dip in your tool bag, prevent shocks and provide a good grip so that you get the most out of each pass of the file.

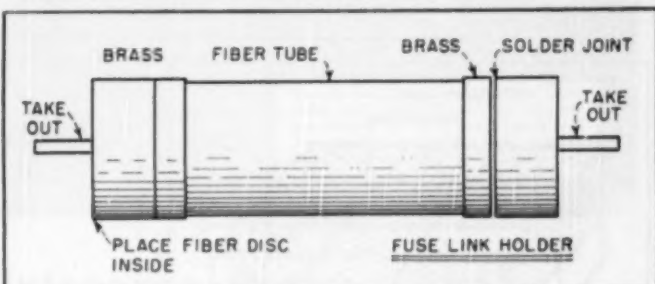
A cartridge from a 150-amp bus fuse makes an excellent carrying case for smaller 10-, 15-, 30- and 50-amp fuse links. These light links will be protected from snarling and breaking and handy when you want them.

The cleaning spoon is handy for removing dirt from around the coupling on conveyor drive units. Accumulated dirt often cuts the fabric disk out of the coupling, and replacement of this disk usually requires an hour or more. Frequent cleaning eliminates the trouble, and the spoon is designed for the cleaning job.

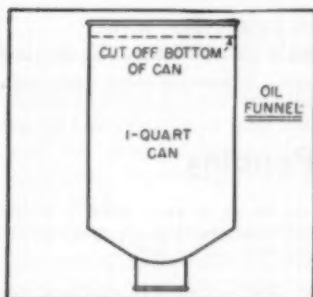
An empty 1-qt fire-extinguisher can of the type illustrated makes an excellent funnel for pouring oil into conveyor speed reducers and other tight spots. Cut off the bottom of the can and round the edges of the cut.



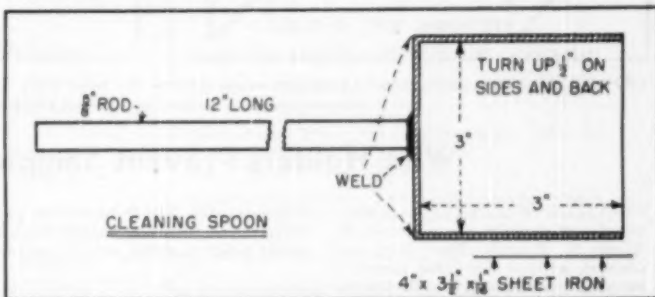
FILE HANDLE, from discarded cartridge and piece of wood, prevents shocks and cuts.



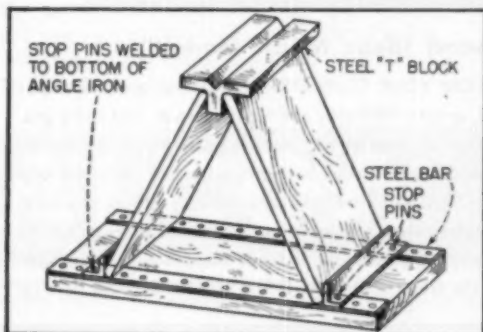
LIGHT FUSE LINKS won't snarl or kink in this case, also made from 150-amp cartridge.



OIL FUNNEL from a fire-extinguisher can.

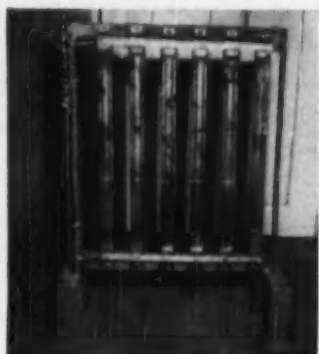


CLEANING SPOON, from scrap-heap parts, cleans hard-to-get-at corners on conveyors.



Adjustable Work Support

THIS SIMPLE WORK SUPPORT, or carpenter's horse, recently described in *Engineering & Mining Journal*, will serve very effectively for much of the equipment that undergoes repair at many mine shops. It is simply constructed and can easily and cheaply be made in any shop. Two flat steel bars, which are drilled at the desired intervals for insertion of the pins at the bottom of the angle-iron stops, are fastened along the sides of the hardwood plank that forms the base of the support. The stops hold two lengths of plank that come together at the top to hold a steel "T" block. The support can be adjusted for various heights by simply changing the distance between the two stops. When not in use, the support can be dismantled and stored in very little space.



STRIP HEATERS on welded steel frame provide ample heat at new P. & R. mine offices.

Shop-Made Electric Heaters Insure Comfort

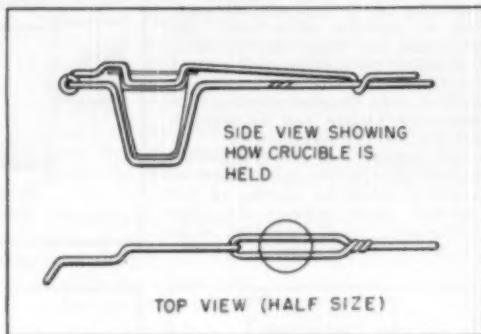
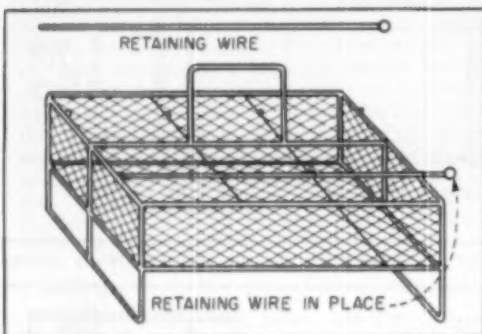
EFFECTIVE ELECTRIC HEATERS for otherwise unheated offices in new buildings are the idea of William Hoffman, chief electrician at Porter Tunnel near Tower City, Pa. This new Philadelphia & Reading operation is under development at present and a permanent heating system has not been installed, pending the completion of all buildings.

Mr. Hoffman made his heaters by connecting six 230-v, 500-w strip heaters in parallel on a shop-made welded steel frame. The power lead is carried through a mica tube to the copper straps that serve as bus bars,

and the mica tube is bolted to the frame for rigidity. Asbestos tape insulates the power lead up to the points of connection at the bus bars.

A perforated cover bolts to the side members of the frame to keep nearby objects away from the strip heaters. Vertical arrangement of the heaters provides even heat and prevents overheating of individual heaters that might occur with a horizontal arrangement. The accompanying photo shows a heater with cover removed.

At the time of this visit the office was comfortable in spite of an outdoor temperature of 15 deg.



CRUCIBLE HOLDERS to prevent popping of samples include nichrome wire basket (left) for simultaneous heating of several samples and a nichrome wire clamp for handling individual crucibles (right).

Wire Holders Prevent Sample Popping

CRUCIBLE HOLDERS to prevent popping of samples are suggested by Albert V. Brucato, New York coal chemist, as time and labor savers in running volatile-matter determinations in coal-analysis laboratories.

Rapidly evolving volatile matter in a closed crucible may not escape fast enough through the narrow spaces between the crucible and its lid. The resulting pressure blows the crucible lid off and necessitates discarding the sample and repeating the determination.

Mr. Brucato eliminated costly delays and repeated work by making crucible holders from materials commonly found in laboratories. A nichrome wire clamp for use on individual samples and a nichrome wire basket for simultaneous heating of several samples prevent crucible lids from popping while permitting gases to escape from the crucible.

The crucible clamp is formed from 0.05-in nichrome wire, as shown in the illustration. The wire basket is made of nichrome gauze and 0.05-in

nichrome wire. The front, bottom and back of the basket are made from a single piece of gauze and the rest of

the frame is wire. Eyes to receive the retaining wire are bent into the top wires of the basket.



Good Ideas Mean Money!

YOU KNOW FROM YOUR OWN EXPERIENCE that good ideas pay off in time saved, greater efficiency and higher output. That's why you, as well as thousands of other mining men, regularly check this section for ideas you can use or adapt at your own operation. Why not help others by letting COAL AGE tell them about the operating, electrical, maintenance or safety ideas you have successfully put to work. COAL AGE will gladly pay you \$5 or more, for each acceptable one, on publication. Address: The Editor, COAL AGE, 330 W. 42nd St., New York 18.



Stonega Coke and Coal Company's Glenbrook Mine, Harlan County, Ky. Conveyor belt housing (4,200 ft. long), tipple and other buildings covered with Alcoa Aluminum Siding. Approximately 170,700 square feet.

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Yet it's aluminum-light. And because of that light-weight, construction is simplified, installation is quick and easy, using standard tools, standard methods.

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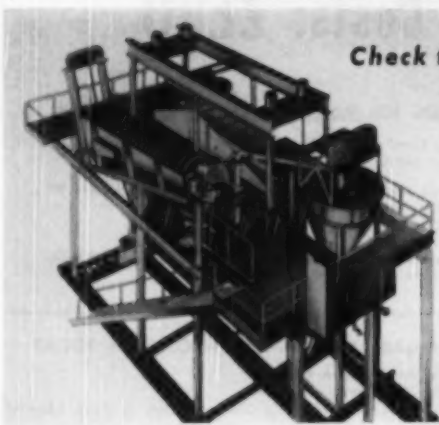


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GET CLEAN COAL WITH

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Check these

MOBIL-MILL FEATURES

- ✓ Prefabricated
- ✓ Low initial cost
- ✓ Low operating costs
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- ✓ Installed for you

More and more cost conscious, profit conscious operators are turning to WEMCO MOBIL-MILLS to meet today's competitive market. Clean coal of accurately controlled quality and grade assures a ready market at top prices.

The WEMCO MOBIL-MILL gives you the flexibility of process, the accurate control and the cleaning efficiency necessary to produce clean, saleable coal of any desired grade. Employing the proven heavy media process, the Mobil-Mill offers outstanding advantages that mean greater profits in coal cleaning:

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- High coal recovery: recoveries from your refuse pile probably would buy a Mobil-Mill in less than one year
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- Control of separating gravity within $\pm .01$, changeable in minutes or capable of being sustained for days

MOBIL-MILLS are available in several sizes to wash from 25 to 420 TPH, with cone or drum type separators to handle sizes from 3/32" to 8".

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Sand Pumps • Conditioners and Agitators • Fagergren Flotation
Machines • Dewatering Spirals • (HMS) Laboratory Units

Shop-Built Dolly Eases Tire Changing

A SHOP-BUILT DOLLY that handles either one or two big trailer or tractor tires speeds tire changing in the garage of the Blackfoot Coal & Land Co., Oakland City, Ind. The dolly, shown in the accompanying photograph, was designed by Hubert H. Rothrock, mechanic, and was built in the local shop. It rolls on four wheels with ball bearings.

To remove a wheel, or both wheels, the tractor or trailer is jacked up high enough for the dolly to roll underneath the tire—about 4 in. If both wheels are to be removed, the operation is simple. The hub nuts are screwed off and the wheels are slid off directly onto the dolly and rolled away. With the two big tires, the center of gravity is so low that there is no danger that the wheels will topple over.

However, if only one wheel is to be taken off and rolled away, the wheel's center of gravity is much higher and there is danger that it will fall over. To avoid this, two steel uprights are placed in sockets at the edge of the dolly bed, as shown in the accompanying photograph. A steel beam with holes cut to fit the upright is placed to bridge the uprights and a scythe-shaped steel hook, welded to the beam, is positioned to reach over the tire

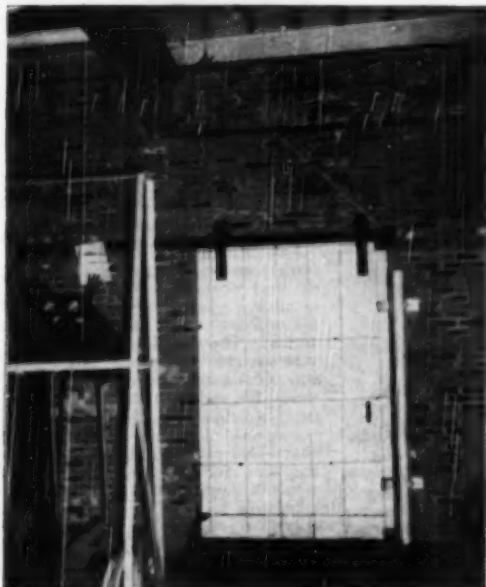


IT'S EASY TO REMOVE A BIG WHEEL from a trailer or tractor with this dolly. The hook keeps a single wheel from toppling over.

and down its far side. The wheel is loosened, slipped onto the dolly bed and rolled away without danger of

falling over. Two pairs of holes are cut in the beam to permit handling tires of different thicknesses.

Fuses Close Fire Doors Automatically

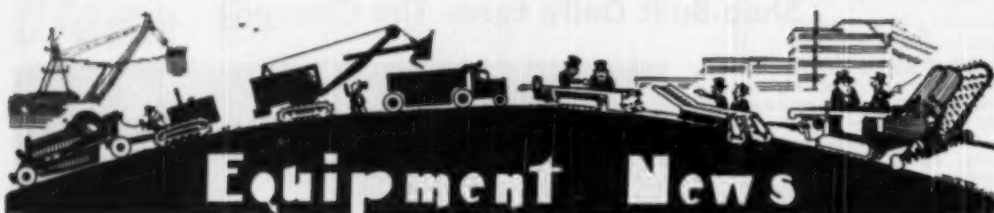


FIRE DOORS ARE CLOSED AUTOMATICALLY when fuses melt in continuous rope counterweight system.

LOW-TEMPERATURE FUSES inserted in the ropes from which counterweights for heavy steel fire doors are suspended give assurance that the garage, the supply-room and the shop will be sealed off from each other if fire breaks out in the garage-shop-warehouse building of the Blackfoot Coal & Land Co., Oakland City, Ind. The fuses, when heated by fire, will melt. When they melt, the continuous-rope counterweight system is broken, and thus is converted into a direct-weight system that pulls the door shut. The heavy iron weights are suspended in the steel tube seen at the right in the accompanying photograph. One fuse can be seen immediately above the door, where a sheet of paper is being held to make the fuse stand out. There is another fuse in the secondary rope system higher up near the ceiling. If either fuse melts, the fire door, between the garage and the supply-room, will close automatically. Similar safety fuses are provided on the door between supply-room and shop, and on a big door that covers a grill through which warm air from the heating plant enters the shop.

Company officials report that these automatic fire doors have cut insurance premiums appreciably.

DID YOU EVER adapt one of the operating tips appearing in this section and come up with a somewhat different but equally successful idea? If so, why not tell COAL AGE so that we can publish your idea, too! See the notice appearing on p 106



New Equipment for Better Mining and Preparation . . . p 110 to p 120

All-Service Hose

Aluminum Conveyor

Car Puller

Centrifugal Pumps

Control Cable

Crankcase Lubricant

Diesel Engines

Flight Conveyor

Hydraulic Jacks

Motor Starters

Rubber Pinch Valve

Plastic Packing

Portable Instruments

Speed Reducers

Spray Nozzles

Time-Delay Relays

Truck Trailer

Vibrating Feeder

EQUIPMENT SHORTS
AND PUBLICATIONS

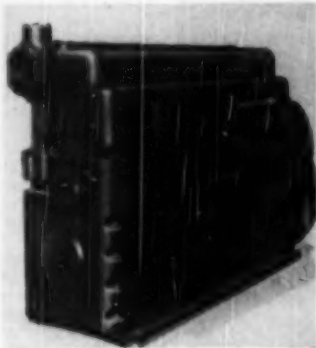


Motor Starters

The new Westinghouse ac magnetic, non-reversing De-ion Life Linestarter is designed for either across-the-line starting of squirrel cage induction motors or as a primary switch for wound-rotor induction motors and is said to provide complete protection of motor, machine and operator. The starter has only one moving part and cannot jam or stick, with a positive-action kick-out spring insuring uniform operation. The exclusive De-ion operating principle extinguishes arcs in a half-cycle or less, the company says. Available in NEMA Sizes 0 through 4, the Life-Linestarter can be applied to all integral-horsepower motors up to 100 hp. It is supplied in standard ac voltage ratings from 110 to 600 v at frequencies of 60, 50 and 25 cycles, for three-phase, two-phase four-wire, and single-phase operation. The cover of the heavy gage sheet-steel enclosure is fastened with a single screw and is easily opened to provide complete wiring accessibility. Up to four electrical interlocks are available for any combination of normally open or normally closed operation. The combination Life-Linestarters can be provided with the AB De-ion circuit breaker for complete circuit protection, or with the non-automatic AB De-ion breaker as a non-fusible disconnect. — *Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa.*

Control Cable

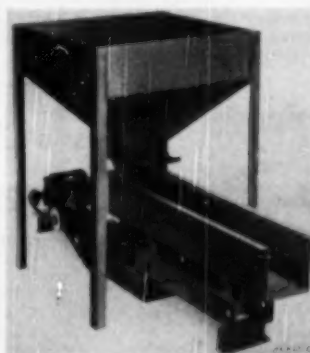
PNR small-diameter control cable for 600-v operation is said to be 25 to 30% smaller and 10 to 15% lighter than conventional types of control cable. The primary insulation of polyethylene is covered by nylon jacket, which in turn is contained within a strong, chemically inert overall sheath. In addition to the smaller conduit possible because of the smaller diameter, PNR cable features high dielectric strength, high resistance to moisture, abrasion resistance, inertness to most chemicals, good low temperature flux and non-restricted application in conduit, direct burial or exposed overhead, the company reports. — *Rockbestos Products Corp., New Haven 4, Conn.*



Diesel Engine

A new type of Ingersoll-Rand diesel engine in the 195- to 375-hp range, known as the TS diesel, is said to incorporate many new design features which have resulted in a previously unattainable combination of characteristics. According to the manufacturer, the TS diesel can easily be made portable, but is not automotive-type; it is small in size, but with big-engine design; light in weight, but with moderate speed; powerful, but with low-exhaust temperature; per-

fectly balanced, but with no balancing devices. It is a four-cycle, 7-in-bore, 8½-in-stroke, single-acting engine with a weight of about 30 lb per hp and a fuel consumption of 0.40 lb per hp-hr. The TS diesel is available in 6- or 8-in-line cylinder designs, capable of delivering 195 to 375 hp at 900 to 1,000 rpm. — *Ingersoll-Rand Co., 11 Broadway, New York.*



Vibrating Feeders

New Free-Flow line of vibrating feeders and conveyors are of the mechanical vibration type that are said to offer a positive action insuring a uniform conveying speed regardless of load. The self-cleaning units feature accurate control, low power consumption and quiet operation. The Free-Flow can be made in any length using a single drive, and will convey hot or cold materials of any size or shape horizontally, around corners and up inclines, the manufacturer says. It is manufactured in sizes and capacities to suit the user's requirements. — *Free-Flow Co., 1530 N. Hollywood St., Hollywood 28, Calif.*

Tandem-Axle Trailer

New heavy-duty, tandem-axle low-bed trailer, with a rated capacity of

New Jig Accelerates Bit Sharpening, Gives More Uniformity



A jig that frees machine bit grinders from hand sharpening has been developed. Advantages, other than easier operating, are faster and more uniform bit grinding. Bits clamp in arms, and operator simply moves handle to get quick, accurate grinding.

Write for Bulletin M-106,
Kennametal Inc., Latrobe, Pa.

Bit to Put Bolt Holes In Hard Roof



New FD bit with Kennametal cemented carbide cutting edge permits use of coal drills to drill bolt holes in hard roof.

Bit gives steady drilling in laminated sandstone, slate, and other hard materials. Free mounting suggestion can be given by Kennametal representatives.

Write for Bulletin M-105,
Kennametal Inc., Latrobe, Pa.

Rod Developed for Roof Drilling

Recently-developed snap-button type pinning rods are used primarily for starting holes in seams where working space is limited. Illustrated is a 3-ft. section; rods are available in sections from 1 to 8 ft. in length. They feature a simple snap and locking action that gives positive and dependable connection.



Write for Bulletin M-129,
Kennametal Inc., Latrobe, Pa.

Mr. Marshal Dafford,
Mine Superintendent
"... 100,000 tons of
coal cut per set."

Mr. Robert Reeves,
1st Shift Foreman
"... like 8 resharpenings."

Mr. Edgar Hixson,
2nd Shift Foreman
"... 40 times more
service."

Mr. Frank Molekamp,
3rd Shift Foreman
"25% faster cutting."

Mr. Curtis F. Rivers,
General Supt.
"... more efficiency,
same bit cost."

Mine Officials

of TENNESSEE PRODUCTS AND CHEMICAL CORP.

Say:

Kennametal is Best

Kennametal U-1 Cutter Bits used in a Goodman 512, at this mine, cut 100,000 tons of coal per service life. Bits are resharpened 8 times, cutting ten 230 ft. x 45 ft. x 4 ft. rooms per sharpening. Feed was stepped up from 24" to 32" to give 25% faster cutting.



These are some of the convincing facts that caused officials of the Reels Cove Mine, Whitwell, Tenn., to become users of only Kennametal Machine Bits.

In hundreds of other mines the hard, wear-resistant cutting edge of Kennametal cemented carbide has meant a steady day by day savings on bit cost, bit changing, and cutting time. Several operators who have scrutinized cost, report that Kennametal Bits are directly responsible for savings of from 3 cents to 5 cents on every ton of coal.

These are reasons why Reels Cove officials say "Kennametal is Best." A Kennametal representative will be glad to give you more proof. He is ready to alternate Kennametal Bits with any other bit on 8 hour shifts, and let the comparative performance show the difference. Any Kennametal representative will make that test.

Contact him by writing Kennametal Inc., Latrobe, Pa. today.

KENNAMETAL®

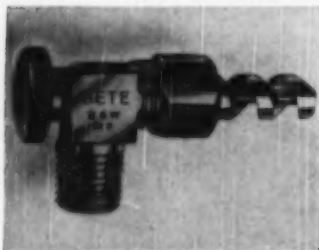


DRILL BITS • MACHINE BITS • STRIP BITS • ROCK BITS

*Write us for any information
you want on Cutting or Drilling*

EQUIPMENT NEWS

40 tons, within the 8-ft-width limit, is available with flat or drop-type platform and is fitted with eight 10:00x15 20-ply tires. Like other La Crosse tandem-axle models, the new 40-ton model is equipped with "walking beams" supporting rear axles that are said to give maximum horizontal and vertical oscillation of each wheel (about 10 in both ways) and thus insure uniform distribution of load over any type of road or terrain. The trailer is fitted with extra-large constant-rise S cam brakes, actuated by either air or vacuum, the company says. — *La Crosse Trailer Corp., La Crosse, Wis.*



Wide-Angle Spray Nozzle

Unusually wide-angle sprays can now be obtained with a new Bete spiral nozzle that was designed for low-flow rates and requires extremely low pressures, according to the manufacturer. It will produce fine and uniform drop sizes with a 180-deg umbrella spray pattern of wide coverage, it is said. Because of its spiral design, the nozzle is relatively non-clogging and can be easily cleaned on the job with a removable pin. It is now available in two sizes, for $\frac{1}{2}$ - to 2-gpm, and for $1\frac{1}{2}$ - to 4-gpm capacities. — *Bete Fog Nozzle Co., Greenfield, Mass.*



Car Puller

New electric car puller can be mounted either vertically or horizontally and is available in five sizes, from 2 to 10 hp and from 1,500- to 6,250-lb line pull. Loaded freight cars at level grades are moved 40 to 48 fpm, according to the manufacturer. Anti-friction bearings are used throughout. Spools are 5 in in diame-



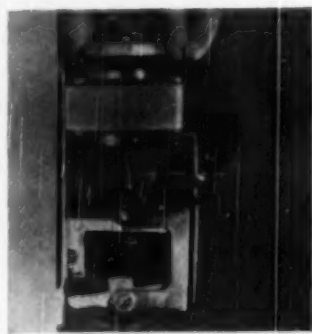
Heavy Duty Flight Conveyor

New Bonded line of heavy duty flight conveyors are built in any length, with flight sizes ranging from 12x2 in to 24x8 in. Features cited by the manufacturer include all-welded steel-truss construction with heavy one-piece cross-section load-carrying pan, flights hung from double chains and chains guided on both loaded and return levels. The units are available with either electric, gasoline or diesel power and a choice of chain speeds, with variable speed control also available. High flared sides permit full-capacity operation up to 45-deg without danger of spillage, the manufacturer says. Bulletin 952 available. — *Bonded Scale & Machine Co., Columbus 7, Ohio.*

ter on 2 hp unit, and 6 in in diameter on other models. All models have 220-440-v, 3-phase, 60-cycle motors, but are available with others. Bulletin 250 available. — *King Mfg. Co., 3146 W. Chicago Ave., Chicago 22.*

Centrifugal Pump

Newest addition to the A-C centrifugal pump line is a new-type rubber-lined unit for handling liquids with solids of 325 mesh to $\frac{1}{8}$ -in diameter. The unit has a vulcanized rubber lining of controlled density to provide maximum wear resistance and is available in open and closed non-choke impeller types of four sizes each. Another type is a vertical sump pump with motor mounted on stool above the sump floor plate, either direct- or Texrope-driven. Bulletin 08B7311 available. — *Allis-Chalmers Mfg. Co., 968 S. 70th St., Milwaukee, Wis.*



The units are available as open or enclosed units, and coils are available in ratings up to 600 v ac, 25 to 60 cycles. — *Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa.*

Time-Delay Relays

New Westinghouse Type AM pneumatic time-delay relays, with adjustable delay from 0.2 to 200 sec, feature a large graduated dial that permits delay adjustment throughout this range for general industrial timing functions. Micro-movement-type precision snap switches, with double "make" and "break" contacts (rated at 15 amp, 115-v continuous duty), are used and additional switches for interlocking purposes can be supplied.

Speed Reducers

New IMO-De Laval herringbone-gear speed reducers are available in single, triple and double reduction units of from $\frac{1}{2}$ to 1,000 hp, with center distances from 4 to 36 in. All shafts turn on high-capacity anti-friction bearings, and output bearings of standard torque units are designed to carry medium overhung loads, the company says. Because of their exceptionally high efficiency—over 98% in single reductions—these units effect worthwhile savings wherever

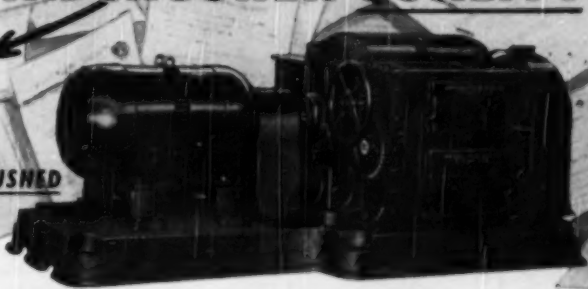
COLD FACTS

on AMERICAN CRUSHER QUALITY

INDEPENDENT SURVEY
OF USERS

CHECKS TONS OF COAL CRUSHED
AGAINST

PARTS REPLACEMENT COSTS



29 Coal Mines and Power Plants Report . . .

- 1 A total of 61,161,372 tons crushed.
- 2 Average age of American Crushers at time of survey—9.35 years.
- 3 Average parts replacement cost \$.0012 per ton (Includes cost of standby parts not yet needed).

CONCLUSION:

AMERICANS CAN "TAKE IT"! NEEDING NEW PARTS LESS OFTEN, THEY KEEP OVERALL PRODUCTION EFFICIENCY HIGH.

HERE ARE A FEW CASE HISTORIES

A COAL MINE IN ILLINOIS reports 4,000,000 tons crushed over 10-year period by their American AC3-E Crusher—with a parts replacement cost of \$.0005 per ton.

AN INDUSTRIAL POWER PLANT IN WEST VIRGINIA has an American 38-S Crusher that has reduced 10,008,000 tons over last ten years. Parts replacement cost was only \$.0008 per ton.

A CENTRAL STATION IN NEW JERSEY crushed 6,000,000 tons over a 20-year period with their American 42-S. Parts replacement cost was only \$.00025 per ton. Crusher still going strong.

CRUSH COAL AT A
TOTAL COST OF
LESS THAN 1¢ PER TON

ORIGINAL COST of an American Crusher . . . plus
MAINTENANCE . . . plus POWER . . . plus INTEREST
ON INVESTMENT averages less than 1¢ per ton
crushed. The American Pulverizer Company has
many case studies to prove this fact.

Let an American Representative analyze your crushing problem. Write for details on the complete line of American Crushers.

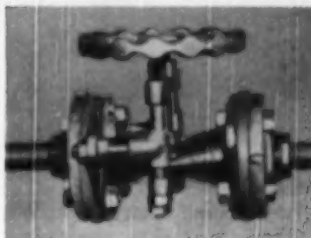
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Originators and Manufacturers of
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EQUIPMENT NEWS



large amounts of power are transmitted, it is said. Bulletin H-HS available.—*De Laval Steam Turbine Co., Trenton 2, N. J.*



Rubber-Pinch Valve

New rubber-pinched valve will outwear metal when installed in pipelines carrying abrasives or corrosive mixtures, the manufacturer says. No packing or repacking is required and the unit absorbs vibration, eliminates "water hammer," and affords a positive seal in the closed position, it is reported. Its metal parts can be refitted to new valve bodies, thus reducing replacement costs. The valve is available in abrasive and corrosive resistant compounds in various sizes from 1½ to 12 in.—*U. S. Rubber Co., Rockefeller Center, New York 20.*

All-Service Hose

New Servall all-service hose is said by the manufacturer to simplify hose storage and handling and reduce investment in stocks by permitting cutting lengths from one reel as needed for air, water, gasoline, oil, mild-chemical or low-pressure spray requirements. Bulletin 137 available.—*Hewitt-Rubber Div., Hewitt-Robins, Inc., 240 Kensington Ave., Buffalo 5, N. Y.*

Crankcase Lubricant

An improved crankcase oil for diesel and gasoline engines is said by the manufacturer to combat sludge and engine deposits under severe operating conditions, even when used with fuels containing up to 1% sulfur, and to give far greater engine protection than ordinary heavy-duty oils. In engines operating under continu-

ous severe loading, sludge formations are substantially reduced, it is said. The oil reportedly prevents rust and moisture corrosion in engines that are idle or in storage and features an alkaline factor that neutralizes the corrosive acids of combustion and results in reduced ring and liner wear in all types of diesel, gasoline and butane engines.—*D-A Lubricant Co., Inc., Indianapolis, Ind.*



Portable Instruments

A new Westinghouse line of portable instruments, designated Type P-12, is rated in the 2% accuracy class and utilizes both moving-iron and permanent-magnet moving-coil mechanisms in compact molded cases. The line includes single and multiple range models. Ammeters are available in full-scale ranges from 20 micro-amp to 50 amp dc and from 5 milli-amp to 50 amp ac. For dc voltages, the full-scale ranges run from 10 millivolts to 800 v, with ac ranges from 1.5 to 300 v. Rectifier milliammeters are available in full-scale ranges from 0.5 to 10 milliamp, and rectifier voltmeters from 2 to 800 v.—*Westinghouse Electric Corp., P.O. Box 2090, Pittsburgh 30, Pa.*



Magnetic Starters

Bulletin 4120 ac combination magnetic starters with disconnect switches, fusible and non-fusible type, are designed for use where a magnetic full-voltage starter, coupled with disconnect means at starter location, is preferred over separately mounted components, the company says. The units feature front operation, maximum safety, simplified installation, thermal overload protec-

tion, high arc interruption capacity, provision for padlocking in "On" and "Off" position and interlock protection in "On" position. They are available in four standard sizes to 50 hp, 3-phase, 550 v, 60 cycles maximum. Literature available.—*Ward Leonard Electric Co., Mt. Vernon, N. Y.*

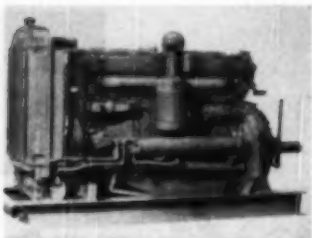
Fire Extinguishing Agent

New Foamite Airfoam is said to be a stable, cohesive, free-flowing, protein-base foam fire-extinguishing agent that blankets fire with a thick, stable insulation to cut off flame-supporting oxygen and smother the blaze. Foamite Airfoam extinguishes fires both in ordinary free-burning materials and in combustible liquids (Class A and B blazes), and works equally well with fresh and salt water, according to the manufacturer. It reportedly floats on the surface of burning liquids and smothers fire, without harm to petroleum products or other flammable liquids.—*American-LaFrance-Foamite Corp., Elmira, N. Y.*



Aluminum Truck Conveyor

A new light-weight all-aluminum bin-to-truck conveyor, the Phillips "Truck-Phil," features ease of handling by one man, airplane-type aluminum construction that is said to make the unit unusually strong and durable and speedy operation. The Truck-Phil is available in three lengths, 16½, 18 and 19½ ft.—*Phillips Conveyor Co., Memphis, Mo.*



Diesel Engines

Recent design improvements are said to provide more power, greater economy, greater dependability and longer life with Murphy diesels. The

ROCK RATED!



THE NEW

P&H

MODEL 955-A (2½ YDS.)

with **MAGNETORQUE*** swing

Watch this new machine get its teeth into a rock job and see what "rock-rated" really means to you. It's *designed* . . . every inch from boom point to crawler shoes . . . to make rock handling easier . . . more profitable for you.

Unbeatable—point for point

P&H Magnetorque eliminates swing friction clutches . . . their troubles and replacement costs. It gives you smoother, faster swings . . . for the life of your machine.

Greater Stability gives you more power at the tooth point . . . and greater work capacity.

Direct Acting Hydraulic Control . . . easier on machine, easier on operator . . . smoother and greater holding power through full wrap brakes and clutches.

*Trade-Mark of Harnischfeger Corporation for electro-magnetic type clutch.

P&H Rapid Reversing Planetary Chain Crowd gives you snappier dipper action. It's more accurate. And crowd chain outlasts 25 to 30 crowd cables.

Get the facts about P&H all-welded strength and Added Values! The 955A is a 2½ yd. version of the P&H 1055 (3 yd. shovel) . . . the machine that has set new low-cost production records everywhere. Write for Bulletin X122, today.

P&H

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A LAUGHLIN EXCLUSIVE THAT PAYS OFF DOUBLE!

A success from the very start, the Laughlin Clevis Grab Hook has proved so popular that users in many fields have asked us: "Why not a slip hook with the same clevis advantages?" We agreed and it's available for the first time.

Like the Grab Hook, the new Slip Hook is easily attached to any welded chain — no connecting fitting needed, and no cutting, bending or rewelding. You just slip the pin through the clevis and chain, spread the cotter — and that's all!

Rugged, heat-treated and drop-forged. Stronger than ordinary hooks — and safer. Forged cotter-housings protect workers' hands.

Separately, these exclusive Laughlin fittings are tops in their own particular jobs. Together, they form a team that can't be equalled for cost-cutting efficiency. Put them to work for you, saving time, labor and money! . . . Write for Laughlin's Catalog 145, data book of the industry. THE THOMAS LAUGHLIN COMPANY, DEPT. 6, PORTLAND 6, MAINE.

LAUGHLIN

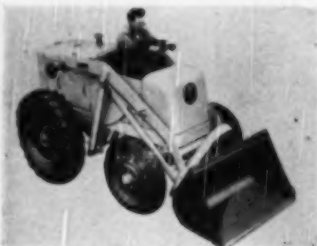
THE MOST COMPLETE LINE OF DROP-FORGED WIRE ROPE AND CHAIN FITTINGS



number of models also has been increased, five 4-cylinder models and six 6-cylinder models ranging in output from 90 to 200 hp now being available. The Murphy principles of plain open combustion chamber, four valves per cylinder, hydraulic servotype governor, remain as the basis of the design of the engines, the additional power output resulting from improvements in their application, the company says.—Murphy Diesel Co., 5317 W. Burnham St., Milwaukee 14, Wis.

Centrifugal Pumps

New Ingersoll-Rand line of cradle-mounted centrifugal pumps feature deep water-cooled stuffing box, smothering gland, ring oil lubricated ball bearings, a heavy cradle shaft and bearing, sturdy channel steel baseplate and an all-metal coupling. The pumps are built in five different sizes, single and two-stage, with sizes ranging from $\frac{1}{4}$ - to 5-in discharge and capacities up to 1,600 gpm and heads to 250 ft. Normal horsepower range is from $\frac{1}{4}$ to 75. The pumps may be driven by various drives. Bulletin 7212 available.—Ingersoll-Rand Co., 11 Broadway, New York 4.



Earthmover

New addition to Hough Payloader line is the Model HE tractor-shovel with a $\frac{1}{2}$ -yd bucket that will dig, load, grade, level, backfill, spread, transport and remove snow, as well as lift, lower, push and haul. A complete Hough-built tractor-with-shovel, expressly designed for tractor shovel work, the Model HE has a full-reversing transmission with four forward and four faster reverse speeds coupled with forward-reverse control separate from the regular gear shift. Full dumping clearance of 91 in is provided, with hydraulic dumping and closing of the bucket permitting loading slowly or abruptly as desired with full accuracy. The company also has announced the complete restyling and improvement of its Model HF $\frac{1}{4}$ -yd Payloader to offer greater engine horsepower, greater built-in tractor effort, more digging power, faster speed ranges and increased stability and balance. The unit has four forward speeds from 2.4 to 19.5 mph, and four reverse speeds from 3.5 to 28.7 mph.—Frank G. Hough Co., 735A Sunnyside Ave., Libertyville, Ill.

WICKWIRE ROPE

A PRODUCT OF

CF&I

Ask any user...you'll find them everywhere

In scores of industries, users of Wickwire Rope have developed an affectionate respect for its performance, safety and long life. And, for true economy, they use Wickwire's WISBOLAYS® Prefabbed. It lasts longer—is easier to cut, splice and install. It's kink-resistant and safer to handle. Wickwire Distributors and Rope Engineers, in key cities everywhere, are prepared to render prompt service in meeting your wire rope needs. Wickwire Rope Sales Office and Plant—Palmer, Mass.

IN THE EAST—Wickwire Rope Steel Div. of C.F.I., 200 Fifth Ave., New York 10, N.Y.

IN THE SOUTHEAST—The Columbia Rope and Wire Corp., Continental Oil Bldg., Houston, Texas

ON THE WEST COAST—The California Wire Rope Corp., 1000—1000 Ave., Oakland 4, Cal.



LOGGING



TRANSPORTATION



MINING



PETROLEUM



MANUFACTURING



MARINE



CONSTRUCTION



How

Republic Elevator Belting

handled the

Ostrea virginica^{*}
problem



• The docile little oyster has a ragged edged shell that has interrupted many an oyster harvest at the Ballard Fish & Oyster Company's plant in Norfolk, Virginia.

Covered with sand and corrosive sea water, the abrasive shells once spelled sudden death to ordinary material handling equipment, but they've met their match at last.

Republic's rhinoceros-hided Excelo Elevator Belting is on the job . . . carrying away as many as 20,000 tons of shells during a single season and, since the installation was made two years ago by Republic's Distributor in Norfolk, the Taylor Parker Company, *there hasn't been even one breakdown to delay production schedules!*

Cost-saving results like this are possible in every industry through use of Republic products because: (1) Republic Rubber products are built to higher standards of quality, and (2) Republic maintains a corps of specialized rubber engineers located close to your plant. These men stand ready to help solve your toughest hose or belting problem. Contact your local Republic Distributor today or write us direct about your particular operation.

Remember, Republic Rubber has been *the* specialist in the industrial rubber goods field for more than 49 years.

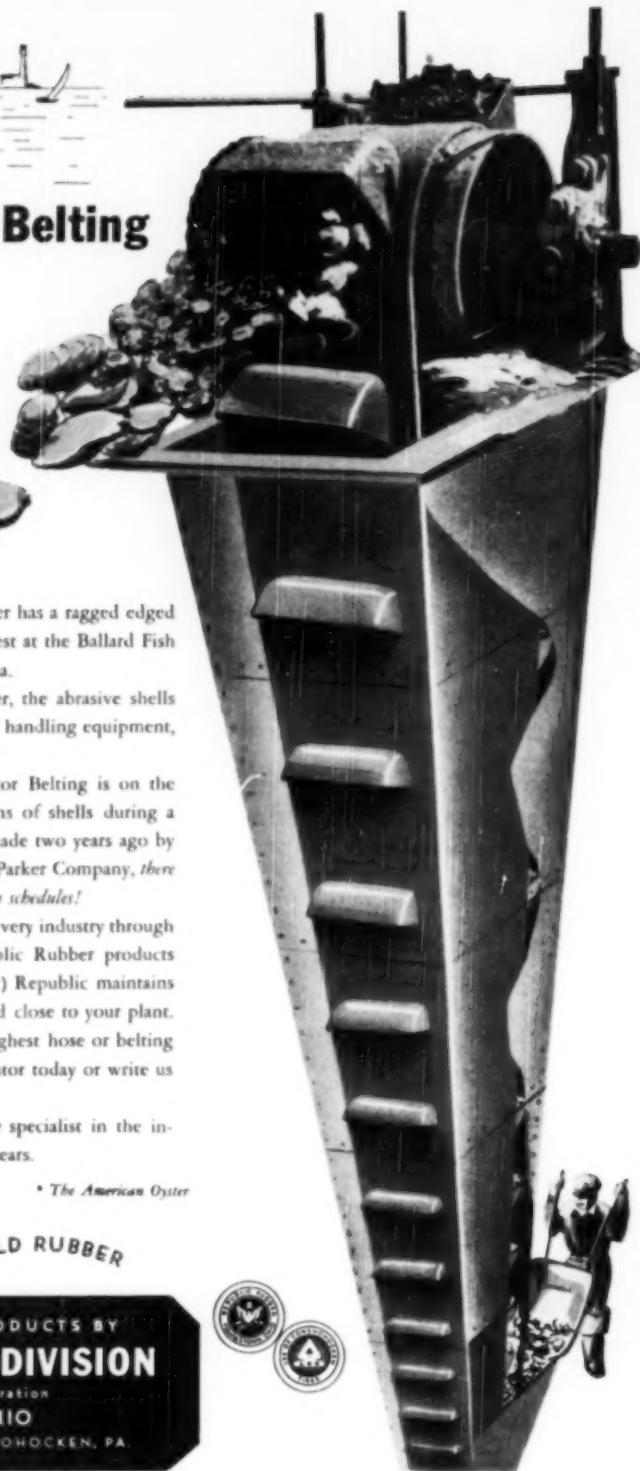
** The American Oyster*

Pioneers in the use of COLD RUBBER

INDUSTRIAL RUBBER PRODUCTS BY
REPUBLIC RUBBER DIVISION

Lee Rubber & Tire Corporation
YOUNGSTOWN, OHIO

FOR LEE TIRES & TUBES • CONSHOHOCKEN, PA.



Plastic Packing

A new non-jacketed plastic packing called "versi-pak" is said to offer long service, increased operating efficiency and maintenance of an effective seal in a large variety of applications. Versi-pak is said to have greater density than woven or braided packings and to be more resilient than die-formed packings. As a result it conforms more readily to the shape of the stuffing box, and can be condensed as it wears, for longer service. It is available in sizes from 1/4 to 1 in increments of 1/16 in in spirals and butt-cut rings. Bulletin A-941 available.—Packing Div., Raybestos-Manhattan, Inc., Manheim, Pa.

Hydraulic Jacks

All models in new complete line of heavy-duty hydraulic jacks from 1 1/4 to 100-ton capacities can be used in vertical or horizontal position with no loss of power, it is reported. As a safety feature, jack handle must be removed from pump socket to open release valves, and the needle point release giving complete safe control over lowering. All models up to 12 tons have telescoping extension screw in piston or ram and all units are tested to 50% overload, the company says. Bulletin HY50 available.—Star Jack Co., Elmwood Park, Chicago 35, Ill.

Improved Magnetic Pulleys

Newly redesigned Eriez permanent magnetic pulleys are said by the manufacturer to provide increased magnetic power, lighter weight and greater structural strength. Available in sizes to carry 12-, 15-, 18- and 20-in belts, and with 24- and 30-in sizes also available, the units, the company states, feature uniform flux distribution from end to end of pulley, reduction of dead metal and total weight. The weight of Alnico metal has been increased for increased pull and holding power, in some models reportedly as much as 50%.—Eriez Mfg. Co., Erie, Pa.

Equipment Shorts

FOOT-OPERATED HYDRAULIC JACK—Go-Jak pump unit develops up to 20-ton pressure for assembly or disassembly of large parts, force-fitted parts, and other machine-shop applications, and has a selector switch that permits operator to choose best speed and capacity for the job. Foot operation leaves operator's hands free. Literature available. — Withol Industries, Lewis St., Eatontown, N. J.

STUD LOCKS — Elliptical spring steel retainers have been applied successfully to locking studs on gasoline and diesel engine heads, housing



Our cheapest insurance against
X-SHOCK!

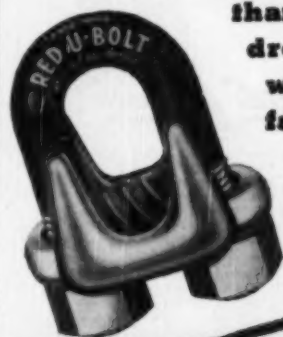
“Crosby Clips? Of course we use ‘em . . . we need 100% reliability in setting steel,” says Dan Hewett, superintendent for the John Beasley Construction Company, erecting steel for the new bridge over the Mississippi River at Hastings, Minnesota. Dan is holding one of the hundreds of Crosby Clips going into the Hastings job.

“Been using ‘em for years . . . have found them completely reliable because they’ve got extra strength when you need it.”

He’s talking about “X-Shock”, that sudden blow or strain or overload on wire rope that engineering can’t calculate. To guard against it, CROSBY Clips have tremendous reserve strength. Be sure of safety for the men and equipment on your job . . . use only genuine CROSBY Clips!

Industry uses more
**CROSBY
CLIPS**

than all other
drop-forged
wire rope
fasteners!



This is an AMERICAN Self-Locking Swatch Block . . . capacities 1 1/2 to 8 tons. Other AMERICAN wire rope blocks to 250 ton sizes.



There is only one genuine CROSBY Clip—identified by the famous red U-bolt. Drop forged from finest steel. Hot dip galvanized—a thin, tough, chip-proof zinc coat. Machine cut threads, chamfered bolt ends. Sizes for 1/4 to 3 wire rope—at distributors everywhere.

MAIL THIS COUPON
FOR FREE BOOK

**American Hoist
& Derrick Company**
St. Paul 1, Minnesota

● Please send free book about CROSBY Clips and their uses.

NAME _____
COMPANY _____
ADDRESS _____
CITY _____ ZONE _____ STATE _____



Special MONEY-BACK TRIAL OFFER!

Buy one "Registered" Roxco and use it for your toughest jobs. If you don't agree it stands up better . . . is handier, faster to use . . . is a bigger value than any pipe wrench that one trial use . . . return that one trial used . . . direct to us (not the seller), within sixty days with a note of price paid and reason for returning. We will refund your money. This get-acquainted offer good until Dec. 31, 1950. Trimont Mfg. Co., Roxbury, Mass.

✓ Check these "engineered" features

1. **Extra Strength** from extra metal put at critical points . . . withstands heavy "side pull" . . . saves costly failure.
2. **Lighter, Handier** because useless metal is eliminated.
3. **Stronger Jaws** of drop-forged alloy steel, with induction hardened teeth but a tough core.
4. **Reinforcing Shoulder Behind Jaw** resists unusual stress.
5. **Rapid Rethreading Action** — New cushion action, with tooth design, avoids seizure

and permits fast work. Parts fit accurately — less lost motion.

6. **Wide, Palm-fitting Handle** makes work easier, cuts worker fatigue.
7. **Reinforced Housing** embodies hammer face to break cast fittings.
8. **Handy, Accurate Pipe Scale** permits quick adjustment to size.

Special Metallurgical Formula — Roxco Metal, and scientific heat treating, mean superior strength in housing and handle.

A Brute for Strength . . . A Beauty to Handle! Now you need not tolerate useless weight in order to get a dependably strong pipe wrench. Through stress analysis during design, useless metal that means tiring weight was engineered out of the new Roxco. Extra metal, exactly where needed for extra strength, was engineered in!

The lighter, handier, faster-working Roxco actually exceeds strength requirements of Federal Specifications for Heavy Duty Pipe Wrenches, Type II, GGG-W-651a. Scientific design, special alloy metal and careful quality-control enable us to register every Roxco by serial number and guarantee every part of it against breakage in any normal heavy duty use! Made in sizes from 6 in. to 48 in. Write for folder and names of local suppliers.

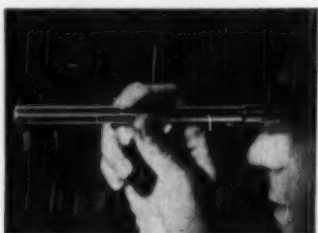
TRIMO-ALLOY WRENCH . . . Roxco's only Rival . . . an all alloy-steel heavy duty pipe wrench long famous for ruggedness. Different in design, but has power comparable to Roxco.

TRIMONT MANUFACTURING CO.
Division of Aetna Industrial Corporation
55 Amory Street, Roxbury 19, Mass.
Makers of Wrenches, Pipe Cutters, Vises and Other
Trimont Time-Tested Tools.

covers and flanges, tappet adjustment screws and other applications, according to the manufacturer. In use, the stud or bolt forces the elliptical retainer into circular shape, creating locking pressure on the threads.—*Security Locknut Corp., 1815 N. Lord Ave., Chicago 39, Ill.*



CLINKER OVEN—Wilhite Clinker Oven reportedly can be mounted on same hinge brackets that catch and hold furnace door in place, and an clinkers and ash are removed they can be deposited in can in the oven causing dust and fumes to be drawn back into the furnace by natural drafts.—*Ralph Eggert Service, W. Jefferson St., Kirksville, Mo.*



POCKET TELESCOPE—New six-power pocket "PENSCOPE" telescope for checking distant dials, gages, car numbers or stockpiles is 5 in. long, weighs 2 oz., gives full correction for spherical and color aberration and permits finger-tip focusing.—*Pan-technica, Ltd., Encinitas, Calif.*

PORTABLE HAND LAMP — Big Beam Junior, Model 111, powered by a 6-v battery designed for 10-sec battery changes, is a dependable and economical lamp adaptable to a wide range of industrial uses, the manufacturer says.—*UC Lite Mfg. Co., 1050 W. Hubbard St., Chicago 22.*

RELATIVE HUMIDITY INDICATOR — Pocket Humidicator, shorter than a pencil, shows relative humidity by the accurate wet-and-dry bulb method, and is equipped with a built-in slide rule that reportedly converts wet-bulb and dry-bulb readings directly into relative humidity, eliminating charts or tables. Bulletin available.—*Weston Electrical Instrument*

Barber-Greene

Proper alignment, safeguard of belt life, is *built into* Barber-Greene Conveyors before they leave the factory. Drive ends and take-ups are assembled correctly and completely . . . thoroughly checked and tested . . . accurately rated for horsepower or load.

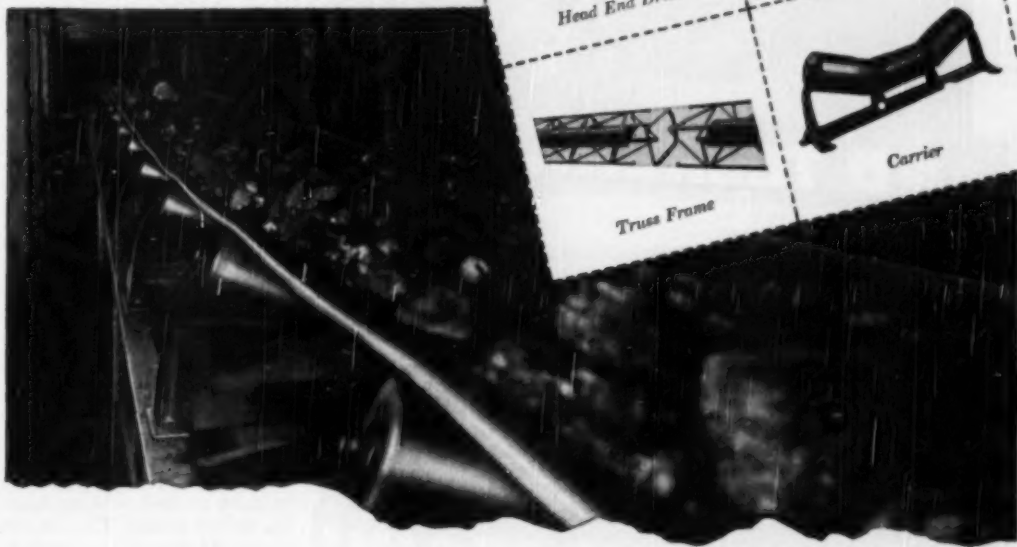
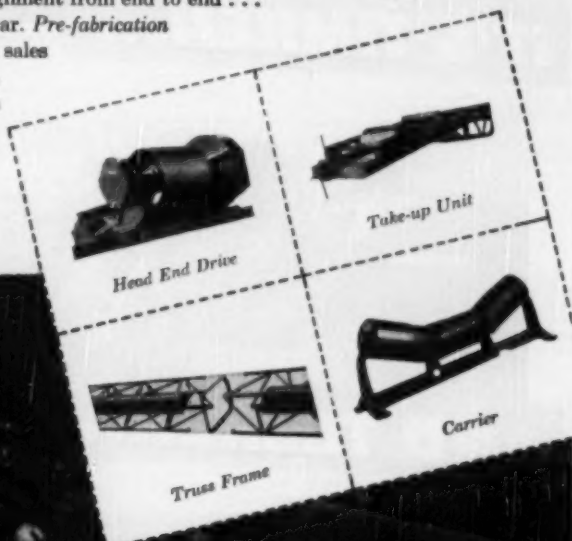
Frames and carriers are *pre-fabricated* . . . delivered to you as complete, self-contained units. Erection is merely a matter of bolting the *standardized* units together.

Barber-Greene *pre-engineering* brings smooth, dependable operation on the job. Precision construction assures correct alignment from end to end . . .

reduces maintenance costs and cuts belt wear. *Pre-fabrication* reduces manufacturing delay . . . permits our sales engineers to give you a prompt quotation.

When the time comes for the mechanization of your mine, get complete details on the B-G Conveyor system.

Barber-Greene Company,
Aurora, Illinois.



BARBER • GREENE COMPANY AURORA, ILLINOIS

Constant flow Equipment



LOADERS



PERMANENT CONVEYORS



PORTABLE CONVEYORS



COAL MACHINES



BITUMINOUS PLANTS



FINISHERS



DITCHERS

For heavy-duty conveyors . . .



IT'S TIMKEN...

Photo courtesy Mr. William Vincent

1. Heavy-duty conveyors everywhere are equipped with long-lasting, trouble-free Timken® tapered roller bearings. A typical example is this West Kentucky Coal Co. conveyor. This company has 24,435 feet of conveyors, carrying over 500 tons of coal an hour. They have relied on Timken bearing equipped Webster idlers since first installing them in 1941.



AND TIMKEN...

2. On the west coast it's Timken bearings for heavy duty jobs. Here, they're used in Bodinson idlers on Pacific Coast Aggregates Company conveyors at their Fair Oaks plant. Why Timken bearings? They have extra capacity for heavy radial, thrust and combination loads. Keep idlers turning freely, reduce belt wear. Help prevent breakdowns, cut maintenance costs.



AND TIMKEN AGAIN!

3. On the east coast, too! In Miami, Florida in 1948, the Acme Concrete Corp. installed 4 conveyors manufactured by Atlas Conveyor Company, Clintonville, Wis. The idlers roll smoothly on 456 Timken bearings—have required no maintenance to date. Wherever you go, you'll find Timken bearings are first choice. There's no other bearing with so much to offer, no other bearing so fully proved. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

WHEREVER THE GOING'S TOUGH
INDUSTRY TURNS TO

TIMKEN
TRADE MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS



Typical application of Timken bearings for conveyor idlers.

NOT JUST A BALL NOT JUST A ROLLER THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION

Corp., 614 Frelinghuysen Ave., Newark 5, N. J.

OVERLOAD RELEASE—New mechanical torque-arm overload release for slow-speed machinery equipped with American Pulley reduction drives reportedly can be quickly installed without alterations to the drive and offers positive, instantaneous protection against damage to equipment from obstructions, choke-loads, overloads, frozen bearings, misalignment, etc. The overload release automatically disengages itself and can be easily reset by the operator.—*American Pulley Co., 4200 Wissachickon Ave., Philadelphia 29.*

MOBILE RADIO UNIT—Type ES-12-A 10-w mobile radio transmitter-receiver, designed for adjacent chan-

nel operation in urban and metropolitan areas and to improve performance in the crowded radio frequency spectrum at the lowest possible price, consists of a 10-w transmitter, receiver and power supply in one cabinet.—*Commercial Equipment Div., General Electric Co., Syracuse, N. Y.*

WATER DEMINERALIZER—New C51B Hydriion Canister Demineralizer permits immediate conversion of ordinary tap water to pure battery water by attachment of the unit to any water faucet, the company says. The unit can be used in fixed or field locations, requires no heat or power and features an indicator showing the exact purity of the water being delivered. Bulletin C51 available.—*A. E. Tomkin & Co., 1828 Columbia Rd., Washington 9, D. C.*

Equipment Publications

New Bulletins Available Without Charge on Request to the Manufacturer—Arranged for Your Convenience to Permit a Quick Check of Items of Interest—Literature on New Equipment Described on Previous Pages Also Is Normally Available From the Manufacturers.

BEARING MAINTENANCE AND INSTALLATION—Anti-Friction Bearing Distributors' Association, 1900 Euclid Bldg., Cleveland 15, Ohio. Booklet, entitled "Installation, Maintenance and Removal of Anti-Friction Bearings," is a comprehensive guide on bearing care designed for those responsible for bearing maintenance and installation. It offers detailed information on bearing types, cleaning bearings, removing and installing, lubrication and tips on how to handle and prepare bearings for storage.

BRAKE LININGS AND CLUTCH FACINGS—Grey-Rock Div., Raybestos-Manhattan, Inc., Manheim, Pa. Catalog I-103 illustrates and describes the various types of Grey-Rock friction materials for shovels, draglines, tractors, etc., illustrating friction material locations on typical units. A major portion of its 100 pages are devoted to friction material size data, equipment-manufacturers part numbers, type of brake band with which the units are equipped and specific Grey-Rock friction-material recommendations.

CRAWLER TRACTORS—International Harvester Co., 180 N. Michigan Ave., Chicago 1. Folder A-420-MM offers a read-at-a-glance explanation of the simple, direct transmission-to-track power train of the typical International crawler tractor. Folder A-419-MM covers the exclusive three-point track suspension, for positive alignment and long track service life.

DC GENERATORS—Electric Products Co., 1725 Clarkstone Rd., Cleveland 12, Ohio. Bulletin B 41-290 illustrates and describes the construction and features of the company's expanded line of dc generators for lighting and power supply.

DRAINAGE—Armo Drainage & Metal Products, Inc., Middletown, Ohio. Bulletin, "Armo Perforated Pipe for Controlling Ground Water," describes how harmful ground water can be controlled to provide stable roadbeds and dry subgrades, shows typical pavement

and roadbed failures and typical methods of treating sub-surface drainage problems. Folder CMS-2650 describes how use of Armo corrugated metal pipe and Pipe-Arch makes special foundation preparation and massive construction unnecessary even with difficult loading and strength problems. Bulletin on Armo end sections illustrates how these structures save time, money and labor on installation and increase culvert efficiency.

ELECTRICAL-MACHINE MAINTENANCE—Allie-Chalmers Mfg. Co., 968 S. 70th St., Milwaukee, Wis. Bulletin O5R7417 designed to facilitate intelligent and consistent maintenance of electrical machines consists of a series of articles by Fraser Jeffrey, assistant to the company's chief electrical engineer, entitled "Care of AC Rotating Equipment." The booklet is broken down broadly into preventive maintenance and machine repairs. Under the former, such subjects as drying moist insulation, measuring insulation resistance, bearing clearances and proper machine applications are covered. Machine repair includes data on stator and slip-ring rotor repairs and balancing of rotating equipment.

FANS—Chelsea Fan & Blower Co., Inc., 1204 Grove St., Irvington, N. J. Catalog provides engineering information, dimensions, performance and prices on various types and sizes of fans for industrial, commercial and residential applications, including direct-drive or belt-driven window fans, industrial pressure fans, mancoolers, PH units, duct booster fans, etc.

FANS—National Association of Fan Mfgs. Association, Inc., 2159 Guardian Bldg., Detroit 26, Mich. Bulletin 110, entitled "Standards, Definitions, Terms and Test Codes for Centrifugal, Axial and Propeller Fans," includes information previously published in four separate bulletins as well as new tables on size standards for various types of fans and illustrations of revised fan arrangements. The bulletin covers the classi-

fication of air-moving equipment, standards, terms and definitions in use and standard codes for air and sound measurements.

FIRE FIGHTING—Aquadyne Corp., 220 E. 42nd St., New York 17, N. Y. Booklet, "Abundant Wet Water for Fire Fighting," discusses data and recommended fire-fighting techniques with "Pyrodyne."

INSULATED CABLES—Simplex Wire & Cable Co., 79 Sidney St., Cambridge 29, Mass. Catalog discusses in detail the construction and features of Simplex-Anhydrex SA insulated cables for 0-2,000-v working range and includes sizes and specifications, along with illustrated explanations of methods of splicing, etc.

INDUSTRIAL VENTILATION—Propeller Fan Mfgs. Association, 2159 Guardian Bldg., Detroit 26, Mich. Industrial Ventilation Guide covers general industrial ventilation problems and their economical solutions. Subjects discussed include "Types of Ventilation," "System Pressure," "Recommended Air Changes," "Duct Resistance Chart," and "Calculation of Resistance." Certified rating tables are provided by leading manufacturers of industrial ventilation equipment.

JACKS—Templeton, Kenly & Co., 1020 S. Central Ave., Chicago 44. Catalog 50 provides complete specifications and application information on all sizes and types of mechanical and hydraulic jacks, covering the 123 models of ratchet-lowering, hydraulic and screw-type jacks that comprise the standard Simplex line.

MATERIALS HANDLING—Downs Crane & Hoist Co., 540 W. Vernon Ave., Los Angeles 27, Calif. Bulletin 200H contains descriptions, specifications, capacity ratings and illustrations of the company's line of hooks, tongs, grips, slings and piling pullers for safe fast handling of heavy loads.

OIL SEAL—Johns-Manville, 22 E. 40th St., New York 16. Bulletin "Johns-Manville Clipper Seal," offers useful data on oil seals, outlines where to use Clipper Seals and how to install them, how the lip and heel construction of these non-metallic oil-seals can be varied, plus information on their construction, advantages and application.

ROOF-BOLTING—Pittsburgh Screw & Bolt Co., Box 1706, Pittsburgh 26, Pa. Bulletin describes features and construction of the "Pit-Bolt" expansion unit and split-rod methods of supporting mine roofs. Included in this bulletin are engineering drawings of all components of both systems, installation photos and application data.

STOREROOM ACCESSORIES—Frick-Gallagher Mfg. Co., 401 Shubert Bldg., Philadelphia 2, Pa. Folder 220 illustrates and describes 25 types of equipment and 18 accessories designed to cut floor space and labor for storage parts and stock, tools and shop supplies.

TESTING SIEVES—Newark Wire Cloth Co., 251 Verona Ave., Newark 4, N. J. Folder describes the Newark line of ASTM and Market Grade Testing sieves and also covers the Newark End-Shak testing-sieve shaker.

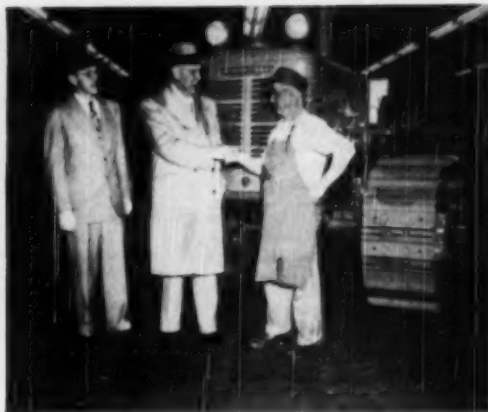
SAFETY-SHOE FILM—Hy-Test Div., International Shoe Co., 1829 Washington Ave., St. Louis 3, Mo. "One Ounce of Safety," a sound motion picture promoting the importance of wearing safety shoes, is available for use by industrial safety directors as a "visual-tool" that can be used to impress upon workers the importance of protecting toes and feet with safety shoes. A manual with opening and closing remarks, projectionist's check-list and a suggested questionnaire for after-meeting discussions, plus a booklet emphasizing facts about safety shoes available for distribution to workers attending, are supplied with the film.

Among the Manufacturers



Goodyear Plans \$1,000,000 Expansion

SCALE MODEL of the new plant being added to the Goodyear Tire & Rubber Co.'s St. Marys, Ohio, facilities as a part of a \$1 million expansion and improvement program scheduled to start last month is placed along side a model of the existing plant. Measuring 170 ft wide and 660 ft long, with a total floor space of 112,000 sq ft, the new building will house molded and extruded goods manufacture, warehousing and engineering services. Improvements to the present plant include the addition of new boilers to the power house.



IH Marks 100,000th Current-Model Tractor

JOHN L. McCAFFREY, president, International Harvester Co., congratulates George Stawarski (right), assembler and repairman, on the completion of the 100,000th current-model crawler tractor, an International TD-18A, at the company's Chicago tractor works. At the left is Leonard Stefanski, general foreman. Messrs. Stawarski and Stefanski have completed 36 and 24 yr of service, respectively, at the tractor works. IH also manufactures crawler tractors at its plant in Melrose Park, Ill., and parts in Milwaukee, Wis.

Joy Mfg. Co., Pittsburgh, has elected E. M. Platts, formerly sales vice president, executive vice president, to succeed the late Arthur S. Knoizen. Mr. Platts joined Joy as vice president in charge of coal equipment sales in 1945, when it acquired the La-Del Conveyor & Mfg. Co., of which he had been vice president. Two years later he was elected to Joy's board of directors and placed in charge of all sales. From 1920 to 1929, Mr. Platts was general manager of the Pittsburgh & Wheeling Coal Co., establishing his own manufacturer's agency for mining machinery in 1929. He became one of the founders of the La-Del company in 1932.

Rex N. Anderson has been named manager of the mining section for the Pacific Coast district, Westinghouse Electric Corp., with headquarters in Salt Lake City. In his new post, Mr. Anderson will supervise sales in an area comprising all or parts of the nine Western states and Alaska. Before joining Westinghouse in 1946, Mr. Anderson was associated with various mining and related companies and had been a metallurgical engineer with the U. S. Bureau of Mines. B. M. Brown, formerly assistant manager of Westinghouse's transportation, marine and aviation sales department, has been appointed manager of special accounts for the company and will coordinate sales negotiations on special customer cases.

J. William Schulze has been elected president of the Pennsylvania Crusher Co., Philadelphia, succeeding William S. Newell, chairman of the board of the Bath Iron Works, the parent company. Mr. Schulze is vice president of Bath Iron Works. John A. Plimpton, division manager, has been elected a vice president. John R. Newell, president, Bath Iron Works, also was elected a vice president of the crusher company. Purchase of all the outstanding capital stock of the Dixie Machinery Mfg. Co., St. Louis, Mo., by the Pennsylvania Crusher Co. also has been announced. E. W. Noxon, former president, is expected to continue with the Dixie organization and has been appointed acting manager.

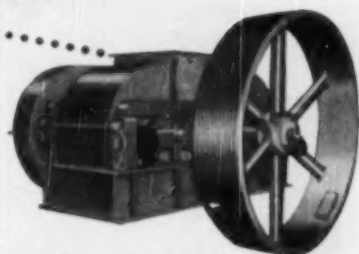
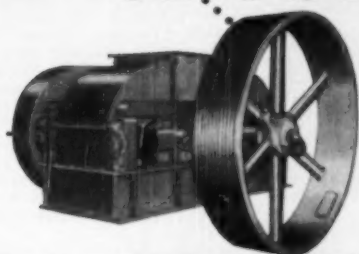
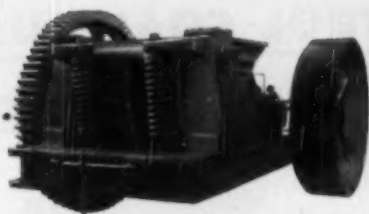
H. R. Comstock has been appointed manager, Central division, Goodyear Tire & Rubber Co.'s Mechanical Goods sales, replacing H. E. Langdon, whose new duties have not been assigned. Mr. Comstock joined Goodyear in 1929, entered mechanical goods sales in 1935 and was appointed mechanical goods district manager at Minneapolis in 1940.

George H. Deike, Jr., chief engineer and secretary, Mine Safety Appliances Co., Pittsburgh, has been elected a director of the company. A son of one of the founders of the 36-yr-old firm, Mr. Deike has been chief engineer since 1941 and secretary since 1948.

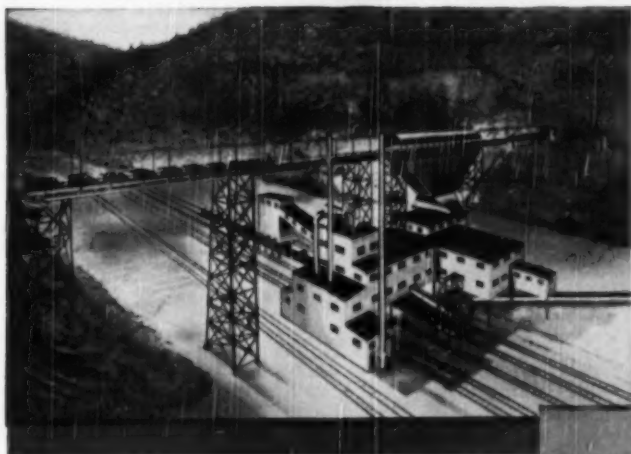
Wagner Electric Co., St. Louis, has announced several changes in executive personnel. P. B. Postlethwaite, president and chairman of the executive committee for the past 24 yr, has retired as president at his own request and has been elected to the newly created office of chairman of the board. J. H. Devor, vice president since 1941, was elected president. H. N. Felton, manager of the St. Louis sales branch, was elected vice president in charge of sales. L. W. McBride, credit manager, was elected assistant secretary-treasurer, to succeed A. K. Bahret, who has reached retirement age after 50 yr with the company. A. H. Timmerman, with the company for 50 yr, has retired as vice president and director. G. A. Waters, vice president in charge of manufacturing, has been elected director to succeed Mr. Timmerman. The company also has announced that the southern portion of the sales territory served by its St. Louis electrical division branch has been set up as a separate unit, with headquarters in Memphis and a sales office in New Orleans. A. C. Allen remains at Memphis as branch manager of the newly established territory. The remaining territory, with a main branch in St. Louis and a sub-branch in Indianapolis, will be under the direction of J. J. Scheid.

John E. Younkin has been named Pittsburgh district manager of the

3 McLANAHAN CRUSHERS



for the modern new
LEATHERWOOD MINE



When an operation is looking for *dependability, long life and maintenance-free* modernization equipment—McLanahan is specified. For this newest, most modern operation McLanahan *engineered* Crushers go on duty.

For your modernization plans, whether it is a single unit or a complete program, contact McLanahan engineers at once.

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TYPICAL EQUIPMENT

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CONTROL COAL DUST with Pangborn Dust Control



PANGBORN Dust Control Equipment gives you:

- efficient coal dust disposal and reclamation
- increased safety
- improved working conditions
- lower equipment maintenance cost
- decreased dust nuisance

In scores of coal preparation plants, Pangborn Dust Control installations have paid off over and over again by improving working conditions, eliminating dust nuisances, cutting maintenance costs, doing a superior job of dust disposal and reclamation. By effectively collecting the fine coal dust produced in the operation of tipples, dry cleaning, de-dusting and other preparation facilities, Pangborn has become a by-word for making profit-stealing coal dust behave.

Whatever your dust problem—high machinery maintenance, nuisance, lost profits through faulty reclamation—Pangborn engineers can help you with an economical and effective solution. Let us make a *dust pocket survey* for you. No obligation—but with the information it gives us, we can recommend the right Pangborn Dust Control Equipment to rid your plant of dust hazards and nuisances.

Write for Bulletin 909A, "The Control of Industrial Dust." PANGBORN CORPORATION, 288 Pangborn Blvd., Hagerstown, Md.

Look to Pangborn for all the latest developments in Dust Control and Blast Cleaning Equipment.



MEET THE DUST HOG

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Pangborn

DUST CONTROL

Wood Preserving Div., Koppers Co., Inc. Mr. Younkin, formerly procurement manager at the division's Marietta, Ohio, office, succeeds Frank H. Fischer, recently made assistant general manager.

Fairbanks, Morse & Co., Chicago, has elected two new vice presidents, as follows: O. O. Lewis, vice president in charge of sales; and F. J. Heaslip, vice president in charge of purchases and traffic.

Link-Belt Speeder Corp., Cedar Rapids, Iowa, has elected Columbus Basile vice president for operations. Mr. Basile comes to Link-Belt Speeder from the parent Link-Belt company's Caldwell plant in Chicago, where he was shop superintendent since December, 1947. He first joined Link-Belt in 1928.

Trumbull Electric Mfg. Co., Plainville, Conn., has organized its marketing department into four geographical regions under the direction of regional managers. Richard C. Lipps, appointed Eastern regional manager, and formerly was New York district sales manager. Allan A. Watson, who joined Trumbull in 1936, has been appointed Central regional manager. The California region will be under the direction of J. Warren Barry, formerly California operations manager, the Northwest region is under the supervision of Willis I. Downie, formerly manager of Northwest operations.

Charles A. Phillips has been made factory sales representative for Federal Motor Truck Co., Detroit, in the Denver region, covering Colorado, New Mexico and southern Wyoming. Walter L. Hayes, formerly head of the company's eastern field organization, has been promoted to assistant general sales manager. Harry L. Norton, a member of the sales department since June, 1946, has been named truck distribution manager. W. A. Knechel has been elevated to the post of assistant general sales manager of the eastern territory.

The Whiting Corp., Harvey, Ill., has taken over the belt and chain conveyor business formerly operated as the Coburn-Foster Conveyor Co., Chicago, in a move designed to broaden the Whiting line. The chain and belt-conveyor product group will be headed by Gordon Foster, former president of Coburn-Foster.

Simplex Wire & Cable Co., Cambridge, Mass., recently announced several personnel changes designed to offer better service to customers. G. L. Roberts has been elected vice president and will remain in charge of the sales activities of the company. G. A. Grauer has been appointed sales manager, succeeding Mr. Roberts. E. W. Davis has been appointed director of engineering and G. J. Crowdes has been appointed chief engineer, suc-

BIG DIPPER

ONE BITE—and this world's largest power shovel—at the Hanna Coal Company's Georgetown, Ohio, mine—strips off enough overburden to fill the living-room of an average American home! The bucket holds 45 cubic yards—can be swung two-thirds of a city block to dump its load.

This one machine has all the complicated lubrication problems of a factory...requires a complete lubrication program to maintain peak efficiency. Socony-Vacuum was entrusted with this job...supplies the right grease for those cable sheaves...the right hydraulic oils for those giant jacks...the right lubricants for those swing, crowd, and crawler gears...other lubricants for all machinery inside.

You, too, can get such a program of *Correct Lubrication*—backed by our 84 years' experience. Just call your Socony-Vacuum Representative.

Gets the World's Greatest Lubrication Knowledge and Engineering Service



Illustration prepared with the cooperation of Marion Power Shovel Co.



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Correct Lubrication

SOCONY-VACUUM OIL CO., INC.
and Affiliates:
MAGNOLIA PETROLEUM COMPANY
GENERAL PETROLEUM CORP.



**For Maximum
SAFETY!
SPEED!
DEPENDABILITY!**

I'll Take...

DUFF-NORTON Mine JACKS

No. 514-MT for THIN SEAMS



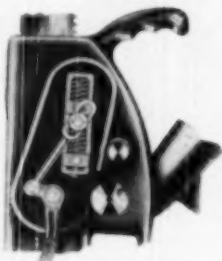
No. 516-MT for MEDIUM SEAMS



No. 521-MT for THICK SEAMS



The three Duff-Norton Jacks illustrated simplify selection of jacks for thin, medium and thick seam mines. All are of five ton capacity ... the 514-MT is 14" high with a 7 1/2" lift ... the 516-MT is 16" high with a 9 1/2" lift ... and the 521-MT is 21" high with a 14 1/2" lift. These jacks perform every lifting and lowering job with ease. For quotation, specify jacks by number.



STURDY SPRING

This world-famous patented spring mechanism is an adjustable, self-contained unit, that assures positive pawl action. Jacks cannot be tripped under load, safeguarding men and equipment.

**Write today for the
"HANDY MINE JACK GUIDE"**



THE DUFF-NORTON MANUFACTURING CO.

MAIN PLANT and GENERAL OFFICES, PITTSBURGH 30, PA.—CANADIAN PLANT, TORONTO 6, ONT.

"The House that Jacks Built"

ceeding Mr. Davis. E. J. MacKenzie has been appointed advertising manager.

Okonite Co., Passaic, N. J., has named E. H. McNeill, formerly assistant manager of the Chicago district, manager of utility and industrial sales for its entire Middle-West territory. Mr. McNeill, who first joined the Central Electric Co., Okonite agents, in 1916, has been associated with the Okonite Chicago office since 1925.

Chain Belt Co., Milwaukee, has appointed Marshall E. Cusic district sales engineer, with headquarters at the Pittsburgh district office. Mr. Cusic first joined the company in 1937 and since his return from war service in 1945, has served as assistant sales manager of the Rex chain and transmission sales department.

J. R. Keach, of Cleveland, Ohio, has been appointed general manager, Quaker Rubber Corp., Philadelphia, Div. of H. K. Porter Co., Inc., Pittsburgh. During his 25 yr in the industrial business, Mr. Keach has been purchasing agent for The Ohio Rubber Co., general plant manager for Firestone Industrial Products Co., and directional sales manager for the Hamilton Rubber Corp.

Gould Storage Battery Corp., Trenton, N. J., has advanced K. A. Vaughan, manager, field engineering, to the newly created position of manager, sales engineering. Mr. Vaughan joined Gould in 1928, became field engineer in 1934 and after 9 yr of field experience, joined the sales staff, becoming field-engineering manager in 1945. F. A. Miller has been named Northeast regional manager for the company. Mal Janis has been advanced to the post of New York district manager, succeeding Mr. Miller, who has a 22-yr background of battery experience and has been New York manager since 1947. Mr. Janis has represented Gould in the New York City area for the past 7 yr. To offer expanded sales engineering facilities to Midwestern customers, Gould's Chicago regional office has been moved to larger quarters at 100 E. Ohio St. The Chicago Office is headed by R. C. Cragg, Midwest regional manager, and C. W. Hanna is Chicago district manager.

Robert B. Moore has been appointed manager of the Mining Div. of the General Electric Industrial Engineering Div., succeeding R. S. Sage, who plans to retire later this year. Mr. Moore joined GE in 1940 and entered the Industrial Engineering Div. in 1944, becoming associated with the Mining Div. in 1948. Other GE appointments recently announced include the appointment of Norman W. Seip as sales manager, Parts Div. of GE's Locomotive and Car Equipment Div., Erie, Pa. Mr. Seip has been St. Louis office transportation sales engineer since 1945. J. M. Crawford, manager of the Large Motor and Generator Div., has appointed P. A. Mc-

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**7 Tough Tests prove these
 YELLOW JACKET Cables are safe**

IN THE LABORATORY United States Rubber Company scientists developed a special, tough, pressure cured Neoprene jacket, which provides maximum resistance to abrasion, cutting, heat, moisture, and especially oil. In addition, U. S. Royals must pass 7 grueling "torture" tests before being certified as safe for your toughest jobs. Write Electrical Wire and Cable Department, United States Rubber Company, 1230 Avenue of the Americas, New York 20, N. Y.



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U. S. ROYAL GOLD MINING MACHINE AND LOCOMOTIVE CABLES

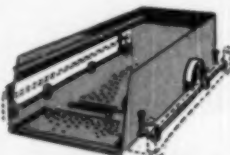


Get your share of the market—screen your coal with a SECO VIBRATING SCREEN

Are you prepared to meet the increasing demands for clean, properly-sized coal? You can be, with a Seco Vibrating Screen on the job for you. From scalping lumps out of R.O.M., to complete sizing, there's a right Seco to help you meet the most exacting requirements for clean, properly-sized coal.

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SCREEN EQUIPMENT CO., INC.
1750 WALDEN AVENUE, BUFFALO 21, N.Y.
In Canada: United Steel Corp., Ltd., Toronto



Terney as his administrative assistant. S. V. Travis will assume Mr. McTerney's former responsibilities as manager of sales for the division. Mr. Travis has named L. H. Matthes as assistant manager of sales. C. E. Burke has been named manager of sales, Specialty Transformer and Ballast Div., Fort Wayne, Ind. Mr. Burke has been manager of the Distribution Transformer Sales Div. of the company's Transformer and Allied Product Div. since 1945. General Electric's newest and 12th Apparatus Department sales district, established March 1 with headquarters at St. Louis, will be known as the Mid-States district. It has been announced by G. F. Maughmer, manager of the district.

With the start of operations of the new \$5,000,000 belting plant of The B. F. Goodrich Co., Akron, Ohio, the company has named H. L. Dixon, formerly production superintendent of the industrial products division, to the newly created post of manager of belting and matting.

James R. Russell, formerly explosives sales representative for Atlas Powder Co. in San Francisco, has been appointed special representative in the company's New York district, explosives department. Mr. Russell will have special assignments throughout the district, which includes New England, New Jersey and Delaware, as well as parts of Pennsylvania, Maryland, Virginia and West Virginia.

The Eriez Mfg. Co., Erie, Pa., has appointed Arlo Israelson chief engineer, replacing W. W. Mojdén, now a sales engineer for Mills-Winfield Co., Eriez sales office in Chicago. Mr. Israelson comes to Eriez from the Flynn Machine Co., Inc., San Jose, Calif., and also has been associated with the Koppers Co., Pittsburgh.

James A. Cowan, with the MacWhyte Co., Kenosha, Wis., for 13 yr., has been transferred to Pittsburgh, Pa., as direct factory representative with headquarters in the Rea Bldg., 704 Second Ave.

F. S. Nickerson has been elected vice president of Mack-International Motor Truck Corp., and named manager of the company's central division sales territory, with headquarters in Chicago. Mr. Nickerson joined Mack in 1945 as sales representative in its Atlantic Div. and since 1946 has been manager of its Baltimore (Md.) direct factory branch.

Thomas M. Stinson, formerly district sales manager of U. S. Steel Products Co., in the St. Louis, Mo., territory, has been appointed general manager of sales with headquarters in New York. He is succeeded as St. Louis district sales manager by G. P. Wardley, Jr., formerly a salesman at the Bennett Mfg. Div. of the Products company in Chicago.

Flexible Tubing Corp., Branford, Conn., has named as a technical repre-

sentative, Wesley L. Guiles, former development engineer who has just returned from Alaska and his duties as Flexible's representative at the U. S. Air Force winter maneuvers. Jack F. Chapin has been appointed development engineer, in charge of product and process engineering. Mr. Chapin formerly was a chemical engineer in the research and development division of Pittsburgh Consolidation Coal Co.

Howard H. Sprinkle has been appointed assistant sales manager, Republic Rubber Div., Lee Tire & Rubber Co., Youngstown, Ohio. Mr. Sprinkle has been a sales representative for the company in the Cleveland and Buffalo areas since 1933.

Ottumwa Iron Works, Ottumwa, Iowa, has opened a newly established export office at 1607 Howard St., Chicago, Ill., and has appointed M. H. Colombe as export manager in charge.

National Electric Products Corp., Pittsburgh, Pa., has purchased I. A. Bennett & Co., Chicago, for 46 yr an exclusive sales agent in 15 midwestern states for the National line of electrical roughing-in materials. R. C. Bennett, Jr., former general manager of the Bennett firm, now is vice president and sales manager of National Electric. Earl M. Nelson, sales manager for Bennett, has become National Electric midwest district manager.

Donald J. Baker, manufacturers' representative, has moved to new offices at 634 Washington Rd., Pittsburgh 28, Pa., designed to permit more efficient operation and better service to customers.

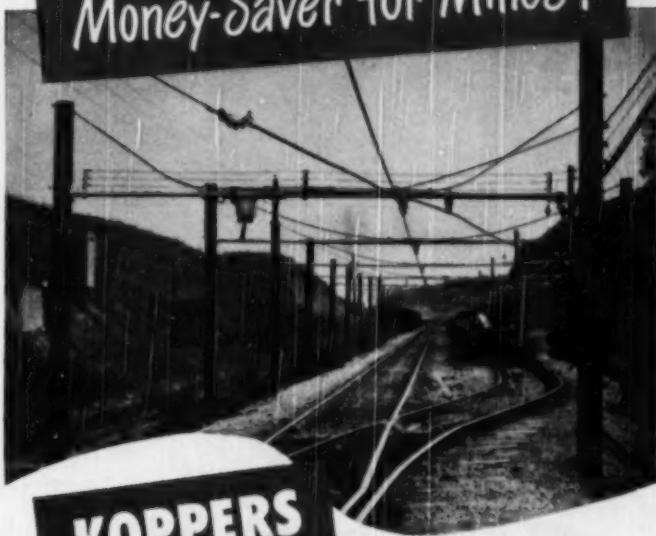
The Electric Equipment Co., Rochester, N. Y., has purchased a million-dollar government-built plant, located in Rochester that totals 59,000 sq ft of floor space. The new plant is expected to permit consolidating the company's activities, which at present include warehouses in Rochester, Buffalo, Watertown, Canton, Ohio, and Houston, Texas, with service to customers to be expanded accordingly.

Pennsylvania Flexible Metallic Tubing Co., Philadelphia, has appointed as its distributor in the Pittsburgh area, the Boston Woven Hose & Rubber Co. of Pittsburgh, 123-125 Water St. The addition of Penflex flexible metal hose is said to permit Boston Woven Hose to round-out its line of quality hose products and offer improved technical service.

Morris, Wheeler & Co., Inc., Philadelphia, has been appointed direct distributor for the complete line of Stoddy hard-facing alloys, for the territory of eastern Pennsylvania and the states of New Jersey, Maryland and Delaware.

The Sink & Float Corp. has moved its offices from the Empire State Bldg. to 100 Park Ave., New York 17.

Money-Saver for Mines!



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Long-Lasting Poles

▶ The trolley poles pictured here don't look like ordinary poles—and they're not! These Koppers Poles are made from strong Southern Yellow Pine. They will stay sound and serviceable because they're protected against decay by Koppers Pressure-Creosoting Treatment.

This treatment greatly reduces the number of costly replacements . . . cuts down repairs . . . effects substantial savings. Koppers Pressure-Creosoted Poles provide rigid support for trolley and feed lines—support you can count on, year after year.

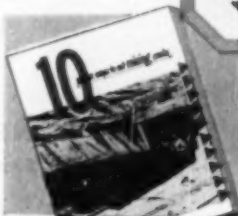
Koppers Pressure-Treated Wood, used in place of ordinary wood, can save money for mine operators in other ways, too. Treated ties, for example, not only stand up under heavy pounding, but frequently cut costs more than 60%. Treated timber sets and props often cut costs over 75%.

That's not all! These and other savings are detailed in our free book, "10 Proven Ways to Cut Mining Costs." Send for a copy, and find out what Koppers Pressure-Treated Wood can do for you. Use the coupon.

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KOPPERS

PRESSURE-TREATED WOOD



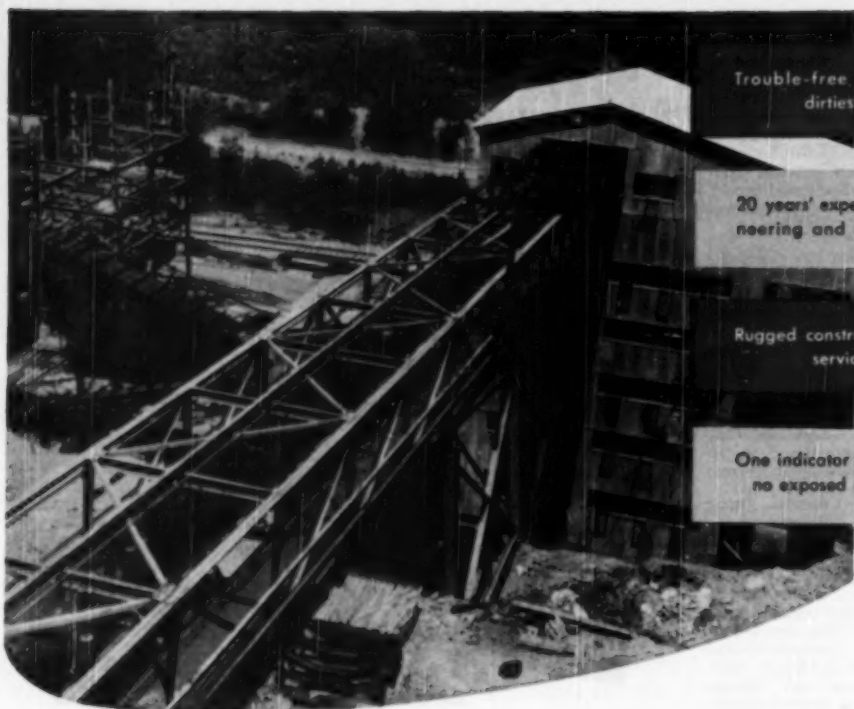
Koppers Company, Inc.
Pittsburgh 19, Pa.

Please send me a free copy of "10 Proven Ways to Cut Mining Costs."

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Trouble-free service on the dirtiest jobs!

20 years' experience in engineering and manufacturing

Rugged construction for long service life

One indicator at the pump—no exposed moving parts

Trabon LUBRICATING SYSTEMS are Job Proved on Mining Equipment

Photo shows the Moss Tipple of the Clinchfield Coal Corporation, where Trabon is standard equipment. Production capacity has been boosted from 6,500 tons per day to 20,000 tons per day during the last four years. More than 1500 bearings are safeguarded by Trabon on this operation.

Write today for information on Trabon oil and grease systems for positive lubrication on coal crushers, washers, shakers, conveyors, and underground equipment.

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Northern Operators Ready Permanent Organization

A YEAR-AROUND ORGANIZATION to represent northern bituminous coal operators in contract negotiations and interpretation was expected to become a reality within a few weeks as officers and directors of the Western Pennsylvania, Northern West Virginia and Ohio Coal associations, and individual operators from those areas, met in Pittsburgh May 12 to hear the first formal presentation of the plan, which has been in the formative stage for more than a year.

Full-time representative of the group in Washington is expected to be Harry M. Moses, president, H. C. Frick Coke Co., who is reported to have advised those attending the Pittsburgh meeting that he would take on the job, completely divorcing himself from the Frick organization if necessary.

Eventual goal of the organization is representation of operators producing some 200,000,000 tons annually. Following the Pittsburgh meeting, the plan was being discussed with operators and association representatives not present and formal announcement of the organization was to be made once an annual tonnage of 100,000,000 was signed up. Operators favoring the program in attendance at Pittsburgh represented almost the 100,000,000-ton minimum desired, it was reported.

While the name of the new organization had not been finally agreed on, it was being tentatively termed the Bituminous Coal Operators' Association. Its operation is to be financed by a tax of 1½ mills per ton, providing an annual income of \$300,000 if the full tonnage is secured. Mr. Moses is to receive a salary of \$65,000, plus expenses, with a 3-yr contract, according to preliminary reports.

Contrary to past newspaper reports, Mr. Moses would not act as a "czar" for the industry. Under the present plan, a seven-man executive committee elected by and representing the directors of the organization will meet with Mr. Moses once or twice a month in Washington. Each company or group producing a million or more tons per year will elect one director, but no member is to elect more than one director. Membership

in the organization is open to individual operators, captive and commercial companies and district associations.

Objectives of the new organization, it is understood, will be to: (1) negotiate wage agreements and enter into them for members; (2) aid in contract enforcement; (3) secure "just and fair practices among members in operating mines under such wage agreements"; (4) promote mine safety; and (5) serve as a source of publicity and information for the group.

In addition to the many long-range benefits to be expected from the creation of a united front, implementation of the program will be particularly valuable at this time, many operators are reported to believe. Many companies are currently being badgered by arbitrary interpretations of the new contract by union officials and by the issuance of new rules and regulations on mining procedure that definitely threaten the economic life of some operations if enforced. A well-knit organization, headed by an experienced negotiator, can do much to immediately alleviate the situation, it is believed.

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Senate Committee Begins Coal Unemployment Study

A subcommittee of the Senate Labor Committee began hearings May 22 to investigate the causes of increasing unemployment in the coal, oil, silver, lead and railroad industries. The resolution authorizing the study, which was introduced by Sen. Matthew M. Neely (D., W. Va.), was unanimously approved by the Senate May 15. Sen. Neely is chairman of the investigating subcommittee and other members are Sen. Thomas (D., Utah) and Sen. Taft (R., Ohio).

(Continued on page 136)

What's Ahead for Lower Costs and Better Quality?

TO HELP YOU analyze your own operations against increased labor costs and growing competition from other fuels, COAL AGE in July will publish a special

"New Mining Horizons" number—an entire issue devoted specifically to the latest means of cutting costs, boosting output per man and improving quality.

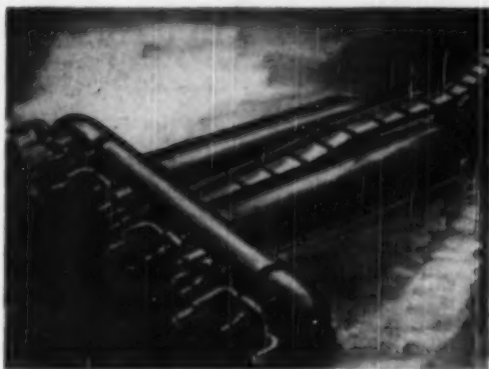
In it, compactly arranged for easy study and reference, you'll find: (1) a thorough analysis and evaluation of the modern methods and equipment that today are getting top results throughout the country; plus (2) a searching examination of the new methods or machines either under development or anticipated that are expected to make important contributions to the industry's progress in the next several years.

Be sure to watch for "New Mining Horizons"—Coming in July COAL AGE.





CONTINUOUS-MINING TEST UNIT NO. 1 with horizontal (left) and vertical rotors (right) has been operated in various seams by the BCR Mining Development Committee to test the principle of cutting an opening in the coal and wedging the coal in the opening. Test Unit No. 2 using four vertical rotors, which were found to be more efficient, is to be put into operation shortly as the final development stage before design and construction of a final continuous-mining unit.



FINAL LOW VERSION of BCR continuous miner is expected to have seven rotors as shown in this artist's drawing based on information now available. It will mine coal 28 to 37½ in thick and 14 to 15 ft wide, the head retracting to 10 ft for trimming. Commercial utilization is at least 2 yr off.



STAINLESS-STEEL CONVEYOR BELT undergoing performance tests at a Pennsylvania mine. Underground tests have been conducted at several properties but further laboratory development has been temporarily postponed. It will be at least a year before the belts can be generally used, the Committee reports.

BCR Mining Development Committee Reports Progress

RESULTS TO DATE in its program of developing new, efficient mining machinery were outlined last month in a progress report issued to subscribing companies by the Mining Development Committee, Bituminous Coal Research, Inc., Huntington, W. Va. Covered in the illustrated reports were the various steps involved in the research, design and testing of continuous-mining equipment, stainless-steel conveying belts, face-conveying systems for continuous mining and several new developments that have been evolved as by-products of the Committee's main development program.

The Mining Development Committee was organized March 30, 1948, to develop new methods and machinery for coal mining, adopting as its first pro-

ject the creation of a machine for low-cost coal production at the face. Following preparation of specifications for the unit by the Mining Advisory Group, composed of 13 operating men representing various coal-producing areas, the Committee appointed Gerald von Stroh director on Sept. 1, 1948. Offices and shop facilities were established in Huntington, Feb. 15, 1949.

Following extensive tests of coal-seam characteristics and design components of the proposed continuous-mining machine, Test Unit No. 1 utilizing a universal cutting machine as a convenient source of power was designed and put in operation with two horizontal rotors as illustrated. The unit cuts two horizontal kerfs. The wedge on the upper rotor breaks the coal down into the cut made by

the lower rotor, the lower rotor carrying the coal away from the face.

The principle of cutting an opening in the coal and wedging the coal in the opening could, if developed into a practical machine, mean a relatively low horsepower requirement and an unusually good size consist, the report points out. The static tests had indicated that the bulk of the coal removed by the wedge would be above 2 in in all seams tested. The horizontal rotors are still under development and are expected to be of value in seams with banded impurities. The use of a universal cutting machine has indicated the feasibility of converting conventional mining machinery into limited-capacity continuous-mining machines, the report stated.

Experience with Test Unit No. 1

**Cheaper by
the Yard**

...or why contractors use
ESCO Dipper Buckets



3-yard ESCO Cast-Welded dipper on Lima 1201, working on
Coyote range stripping operation of S. J. Graves & Son.

GREATER PAYLOAD CAPACITY

per pound of bucket; fast loading; quick, complete discharge; ability to stand up under punishment—these are some of the qualities of ESCO Cast-Welded general purpose dipper buckets that give the operator more passes a day and more payload with each pass. They are the qualities that reduce the cost per yard of material moved.

Here are some of the jobs on which the built-in performance of ESCO buckets has

been fully demonstrated: Neversink Dam; Garrison Dam; Pennsylvania Turnpike extensions; Merriam Dam; Washington-Baltimore Express Highway; Wautauga Dam; Beveridge Parkway; Pittsburgh Express Highway.

The records of sustained service made by ESCO dipper buckets under severe digging conditions are possible only because of their rugged construction. Details of construction and full information on sizes, dimensions and weights are contained in ESCO catalog 156-B. Get a copy from the ESCO office nearest you, or fill in and mail the coupon. Dealers in all major cities.

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DIPPER, DRAGLINE
AND COAL LOADING
BUCKETS

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Please air mail catalog 156-B on your Cast-Welded Dipper Buckets to

Name

Company

Address

City

Zone State

Make and model of machine used



Morgan Heads Ayrshire

JAMES W. MORGAN, vice president and general manager since August 1, 1949, last month was elected president of Ayrshire Collieries Corp. and its operating subsidiaries, to succeed

Robert P. Koenig, who resigned to become president, Cerro de Pasco Copper Co., New York. Mr. Koenig, who has been affiliated with Ayrshire and its predecessors for 14 yr, will continue as a member of its board of directors.

Before joining Ayrshire, Mr. Morgan was associated with the Truax-Traer Coal Co., in charge of its West Virginia operations. From 1924 to 1948, he was with C. A. Hughes & Co., Cresson, Pa., serving as vice president and treasurer from 1932 on. Following his graduation from Lehigh University in 1921, he joined the Lilly Coal Co., Lilly, Pa., as a clerk, later serving as foreman and superintendent.

In 1943 and 1944, Mr. Morgan was assistant deputy coal mines administrator in the U. S. Department of Interior. He served as a labor consultant on bituminous coal for the department from 1945 to 1947 and has been a member of the Secretary of the Interior's National Bituminous Coal Advisory Council since it was organized.

indicated that vertical rotors would be considerably more efficient than horizontal rotors and the final version is expected to utilize that design. The vertical rotor shown in operation on Test Unit No. 1 reportedly mined 2 tons per min with 25 hp in the Fairmont area of the Pittsburgh seam, which tests had indicated would be one of the most difficult areas to mine.

Before the final low version of the machine is designed and built, however, Test Unit No. 2 is to be completed and operated under test. This unit is to have four rotors instead of the seven planned for the final machine. The final low unit, shown in the artist's drawing, is at least 2 yr from commercial utilization, the Committee states. It will be 24 in high and will mine a range of 28 to 37½ in, utilizing 75 to 100 hp. The head will mine a 14- to 15-ft width, retracting to 10 ft for tramping or moving from a place. It will be equipped with a flexible tailboom.

Continued development work on the stainless-steel belt is being held up until Test Unit No. 2 is completed, the report disclosed. Several operating tests have been made underground and although continued laboratory work is being postponed, performance data are being secured on a surface belt installed on 90-ft centers shown in operation at a Pennsylvania mine. One of the major problems of the steel belt is securing a splice that is easy to install under actual operating conditions. More than 30 different splices have been tested and further work is yet to be done on this phase. Since the accompanying photograph was taken, every other supporting idler and all of the center rollers have been removed. The better beam characteristics of a steel belt permit removing the idlers, the report states,

and will ultimately make for lower power requirements and fewer elements to maintain. It will be at least a year before stainless-steel belt can be generally used, the Committee believes.

Among the new developments that have been evolved as by-products of the Committee's major program are the following, which are in various stages of development or testing: a drill bit for use with air blasting that would require considerably less power; a self-sharpening cutting bit for continuous mining; a bit featuring increased cutting edges; a lightweight vehicle for transporting supervisors and equipment underground that can be put on or off the track by one-man; a new-type closure for hydraulic tubing; and a tool designed to increase shaft life by removing the machining stress in the filets of journals.

A. L. Lynn, vice president, Island Creek Coal Co., Huntington, W. Va., has been elected to represent natural resources in the U. S. Chamber of Commerce board of directors for a term of 2 yr. Mr. Lynn is one of 19 directors elected by the Chamber's national councilors to represent 10 election districts and nine main divisions of business.

Joseph C. Puraglove Jr., vice president in charge of research and development, Pittsburgh Consolidation Coal Co., has been nominated as an alumni trustee on the Cornell University board.

L. Russell Kelce, president, Sinclair Coal Co. and affiliated companies, has been elected president of the Southern Coal Co., Inc., following acquisition of the controlling interest in the company by the Sinclair group. **S. L. Jewell** will continue as vice president and director of sales, with headquarters in Chicago. **P. B. C. Smith** has been elected vice president in charge of the eastern division, with headquarters in Knoxville. **B. H. Smith** will continue with that division in an advisory capacity. Mr. Kelce also was elected president of a newly formed Southern Coal subsidiary, the Sinclair-Southern Co., organized to handle the sales of stoves and equipment. Active management of the new company will be under **R. J. Billings**, with headquarters in Memphis, and **C. C. Davis** will serve as sales manager, with headquarters in Chicago. No change in the basic policy or program of the Southern Coal Co. is involved, Mr. Kelce emphasized.

W. F. Hughes has been appointed general mine foreman, Wheelwright mine, Inland Steel Co., Wheelwright, Ky. He has been succeeded as mine foreman at Mines Nos. 1 and 2 by **Pat Adams**. **Hobert Smith** has been transferred from the safety department to the operating department as coal inspector.

M. J. Donnelly, formerly superintendent, Mine No. 8, Peabody Coal Co., Tovey, Ill., has been appointed superintendent of Mine No. 17, Pana, Ill., replacing **J. W. Abrell**, who has taken a leave of absence because of ill health. **Joseph Craggs**, mine manager at No. 8, has succeeded Mr. Donnelly as superintendent at that mine. **Tony Shimkus**, assistant mine manager, has become mine manager.

Several changes in section foremen at the West Virginia operations of the Eastern Gas & Fuel Associates recently have been announced. At Koperston No. 2 mine, **Carl W. Smith**, machine operator, has been promoted to section foreman, and at No. 1 mine, **Herman Stover**, machine operator, has been made moving foreman. **E. T. Walker** has been added to the night force as section foreman at Stotesbury No. 8 mine. **Holland McKinney**,

Personal Notes

D. W. Buchanan Jr. was elected president of the Old Ben Coal Corp., Chicago, at a meeting of the board of directors held April 26. The post had been vacant since the death of **George F. Campbell** last June. All other officers of the organization were re-elected. Mr. Buchanan previously was a vice president and director of the company. A graduate of Princeton University, Mr. Buchanan has spent his entire business life with Old Ben, interrupted only by wartime navy service in the Mediterranean and the Pacific. He is the son of the chairman of the board of the company and the grandson of the late **M. D. Buchanan**, a pioneer coal operator.

Loading "Nitramon" for typical blast consisting of 28 holes 54 feet deep with 18 foot spacing



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The blast illustrated produced 43,360 cubic yards of well-broken rock, enabling shovels to dig without interruption. Shattered rock was quickly and easily loaded . . . production speeded.

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Overburden averaged 45 feet in height above this rich seam of coal. It consisted of 2 to 5 feet of shale over the seam, with 25 to 35 feet of massive sandstone above this, topped with 5 to 10 feet of dirt.



"Primacord" is threaded through two "Nitramon" Primers in preparation for the loading of holes. "Nitramon" cannot be detonated by commercial blasting caps, friction or the impact of falling objects. Yet "Nitramon" Primer—itsself relatively insensitive—readily fires charges.



The high degree of fragmentation, characteristic of "Nitramon" blasts, can be seen in this picture showing a large stripping shovel at work after the shot has been fired.

formerly with Powellton No. 7 and Helen mines, has become section foreman at No. 2 Gas mine. Heath Bell has been employed as section foreman at No. 11 mine, Helen and at Eccles No. 5 mine. James E. Haga is acting section foreman.

L. A. Hopper, executive secretary of the Hazard Coal Operators' Association, has been elected vice president of the Columbus Mining Co., Chicago, succeeding the late Lewis H. Allais. Mr. Hopper is expected to divide his time between the Chicago office and the mining operations in Kentucky.

Senate Unemployment Study

(Continued from p. 131)

Testifying on the opening day, both D. T. Buckley, of the National Coal Association, and Thomas Kennedy, vice president, UMWA, warned of the unreliability of foreign sources of oil supply in the event of war. Mr. Buckley called for an import tax of \$1.05 a bbl on residual oil, to permit coal to economically compete with the cheap foreign oil now coming into the country. Mr. Kennedy supported Mr. Buckley's estimate of the impact of oil imports on the coal market, stating that imports during 1949 had thrown 25,000 coal miners out of work.

The committee is to report its findings and recommendations to the Senate not later than June 25. Various representatives of the coal industry were slated to appear before the group.

Hearings before a House Subcommittee on Education and Labor, which had been scheduled to investigate the same general subject, were postponed until May 31.

Ohio Reclamation Group Has Public Open House

Open house was being planned by the Ohio Reclamation Association at its field office in Cadiz during the first week in May for all interested in knowing how strip mine lands are being reclaimed. That week was expected to wind up the spring planting and visitors were to have an opportunity to see a planting crew in action.

One of the features of the week was the opening of the association's new soils laboratory, which it hopes to make one of the best in that section of the state for conducting practical tests of soils and water. Although installed primarily to secure better growths on the strip mine land, the facilities of the laboratory are being made available to soil conservation technicians, county agricultural agents and others who are trained to conduct such tests.

Equipment in the laboratory includes a potentiometer for indicating

soil acidity electrically, a water analyzer and materials for chemically testing soils. The water analyzer, a colorimetric comparator indicating the contents of chlorine, manganese, iron, fluoride and bromine, is valuable in checking for pollution, whether chemical or bacterial, and will serve as an aid in securing better aquatic vegetation and fishlife in the strip mine lakes. The soil testing equipment will determine the minerals and their amounts needed by the soil to correlate it with the growths desired.

The association staff was to be on hand during the entire open-house.

House Group Barred From Quizzing Lewis on Code

A House subcommittee planning to call John L. Lewis to answer charges that he had used "secret signals" to foster the mine stoppage earlier this year had its subpoena powers revoked last month. Rep. Lesinski (D., Mich.), chairman of the House Committee on Education and Labor, first abolished the subcommittee, but later reinstated it short of its subpoena authority. The announcement by Rep. Jacobs (D., Ind.), chairman of the subcommittee, that Mr. Lewis would be summoned was called "high-handed" by Rep. Lesinski, who said that a chairman of a subcommittee "can't bring out business as he pleases" and that Rep. Jacobs had no authority for the proposed investigation.

Continuing its investigation, the subcommittee heard testimony of Lloyd H. Sidener, former president of UMWA Local 7455, Canton, Ill., who said that he was suspended because he tried to go back to work after issuance of the federal injunction, and Joseph Dickmon, who was suspended from the Library, Pa., local last October for calling Mr. Lewis a dictator.

Mr. Lewis was invited to appear before the subcommittee, but declined to do so, stating in his letter to the group that there was no foundation for the charges.

Later, Mr. Dickmon May 18 announced that he was through with coal mining although he had been scheduled for reinstatement in the UMWA very soon. He had been reported as having apologized to District 5 officials earlier in April for his remarks last fall. However, in his statement two days before he was to repeat the apology before officials of the local, he said that his earlier apology had covered only a part of his charges, chiefly that no financial reports were filed by the UMWA. He still thought Mr. Lewis a "dictator" and the Welfare Fund a "Lewis puppet," he said.

Meanwhile, in the case of Mr. Sidener, Ross M. Madden, Chicago regional director of the NLRB, issued a complaint against the UMWA and the United Electric Coal Cos., charg-

ing violation of the law in interfering with Mr. Sidener's right to work. A threat by the union to strike if he was employed is reported to have caused the company to discharge Mr. Sidener. The former union official had filed the charges with the NLRB March 15 and had stated publicly he had received the secret signals through Mr. Lewis' "chain of command" (*Coal Age*, April p. 164). The NLRB hearing on the complaint was scheduled for June 20.

Lake Carriers Join in Smoke Control Program

As the first step in a joint program by coal producers, lake carriers and smoke-abatement officials, the Coal Producers' Committee for Smoke Abatement and the Lake Carriers' Association are sponsoring an intensive air-pollution control program, a major part of which is the provision of suitable vessel fuel for improved smoke performance and economy.

Normal fuel sources, for example, are to be restricted to double-screened sizes for hand firing. In addition, fuel standards have been set up on the basis that egg size 4x1 1/4-in with approximately 8 1/2% ash is preferred. However, the acceptable size range will include 6 and 7 in, provided the bottom size is not less than 1 1/4 in. For top sizes of 3, 4 and 5 in, a minimum bottom size of 3/4 in will be acceptable. In all cases, the under-size resulting from handling must be kept to a minimum. Any size with an ash content exceeding 10% is not suitable for vessel fuel. The final range of quality and size which can be used will be governed by the ability of the vessels to comply with the smoke regulations of the various lake ports.

As a part of the effort, educational and crew-training programs are now being prepared. Joint participation in research and technical study on the problem has been approved by both the Lake Carriers' Association and Bituminous Coal Research, Inc.

Pittsburgh Consol, Hanna In Stockholder Suit

The Pittsburgh Consolidation Coal Co., 15 of its directors and the M. A. Hanna Co. were named defendants in a lawsuit filed in the Cleveland federal court May 11 charging mismanagement of Pittsburgh Consol for the benefit of the Hanna company and the officers of both companies.

The action was brought by Abram J. Berkwitz, Brookline, Mass., who said he owned 300 shares of Consol stock and that he was acting for other stockholders as well. Recovery of an unspecified amount for Pittsburgh Consol and its stockholders was asked for in the suit.



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SAFE SUPERVISION for 67½-yr.—These foremen and supervisors, part of the group of more than 60 who attended the first annual Foreman Safety Award meeting in Washington, D. C., directed their crews without lost-time accident for long stretches, as indicated: J. W. Lowe (left), 10 yr; George Thornley, 9½ yr; Errol Barker, 9½ yr; A. C. Cunningham, 10 yr; Joe Mancho, 8 yr; William Borza, 10 yr; and Kenneth Johnson, 10½ yr.



SAFETY DIRECTORS saw their foremen receive NCA certificates: Reese Nicholas (left), Pittsburgh Coal Co.; C. R. Stahl, Eastern Gas & Fuel Associates; Robert Muir, Rochester & Pittsburgh Coal Co.; James Forgie, Armco Steel Corp.; Stephen Younger, Pond Creek Collieries; C. E. Linkhouse, Island Creek Coal Co.; Arthur Bradbury, Inland Steel Corp.; M. E. Prunty, Consolidation Coal Co. (Ky.); and H. D. Jones, Rochester & Pittsburgh Coal Co.

Nearly 1,000 Bituminous Foremen Win NCA Safety Awards

MORE THAN 60 FOREMEN and supervisors among whose crews there has been no lost-time accident for four years or more were honored with certificates of merit at a luncheon in Washington, D. C., May 12. The award luncheon was the top event in a two-day schedule which included also a visit to Capitol Hill and sight-seeing tours to points of interest in and near the city. The awards and program were conceived and sponsored by the Safety Division, National Coal Association.

The men who converged on Washington were only a small fraction of the 969 supervisors known by the

Safety Division to have no-lost-time-accident records of a year or more. In the opinion of Earl Maize, Safety Division director, there are many others whose records are not known to the National Coal Association. Certificates are being mailed to supervisors who did not attend the Washington meeting and will be presented in ceremonies arranged by individual companies.

"These certificates and this two-day visit to Washington are the bituminous industry's expression of appreciation for the work you are doing," John D. Battle, executive vice president, NCA, told supervisors at the

luncheon. Mr. Battle, who signed the certificates along with Mr. Maize, personally presented the awards. Other featured speakers at the luncheon were Ralph Mulligan, director, Bituminous Coal Institute; C. R. Stahl, assistant to the vice president, Eastern Gas & Fuel Associates; and Albert L. Warner, Washington radio commentator.

Longest known no-lost-time-accident record, according to the NCA Safety Division, is that of Roy Foster, Powellton No. 3 mine, Eastern Gas & Fuel Associates, whose crews have been without accident for 20½ yr. Other known records of 10 yr or more are as follows:

Eastern Gas & Fuel Associates: E. J. Goodson, Carswell mine, Kimball, W. Va., 14½ yr; Estell Price, Powellton, W. Va., 14 yr; E. I. Stallard, Kimball, 13 yr; William Terry, Kimball, 12 yr; George Brooks, Beards Fork, W. Va., and J. A. McArdle, Elkridge, W. Va., 11 yr; Kenneth Johnson, Gamoca, W. Va., 10½ yr; and James W. Lowe, Federal No. 1 mine, Grant Town, W. Va., 10 yr.

Pittsburgh Coal Co.: William Borza, Lindley mine, Library, Pa., 10 yr.

Armco Steel Corp.: A. C. Cunningham, Montcoal, W. Va., 10 yr.

In addition to the 10-yr men, some 50 supervisors have records running from 5 to 10 yr. Of the 969 men honored with certificates, 674 have established records of longer than a year without lost-time accidents to their crew members.

The following men with accident-free records of 4 yr or longer attended the meeting in Washington:

Armco Steel Corp.: James H. For-

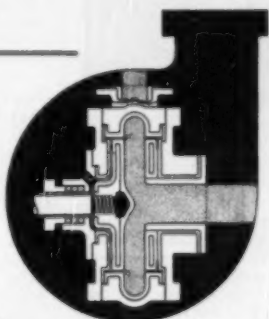


NO LOST-TIME ACCIDENTS for 250 yr: That's the total time for foremen who toured Washington under the sponsorship of the Safety Division, NCA, May 12. Among other places, they visited the Capitol.

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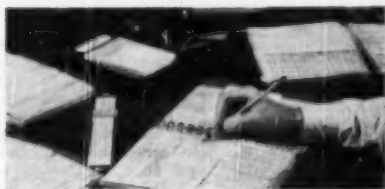
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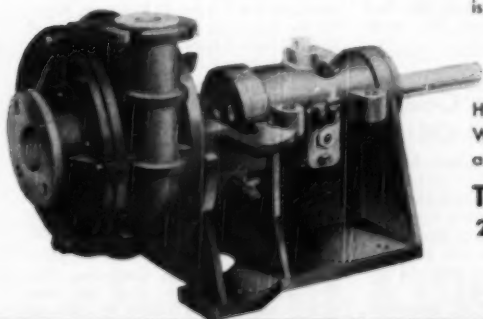


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gie, safety director; A. C. Cunningham and Errol R. Barker.

Consolidation Coal Co. (Ky.): M. E. Prunty, safety director; N. L. Akers, Rex Lawrence, Willie Baker, R. D. Kyle, Dewey Looney, Arnold Kelly, Ed Osborne, Henry Horner, L. H. Davis.

Eastern Gas & Fuel Associates: C. R. Stahl, safety director; J. R. Burgess, A. H. Steele, T. B. Bailey, E. C. Cooper, K. H. Johnson, Cleve Christian, J. W. Lowe, T. R. McClure, Charles Ruffing, Thomas Lowe, George Thornley, Ted Ramsey, S. J. Bonds, Grady McCarthy.

Inland Steel Co.: Arthur Bradbury, safety director; W. A. Pack and Oscar Brafford.

Island Creek Coal Co.: C. E. Linkhouse, safety director; Mitchell Miller, Ed Campbell, Berkley Clear, F. M. Shumate, Walter Browning, Joe Nichols, Jesse Ray, Alex Matney, Everett Adkins, Wetzel Neese.

Pittsburgh Coal Co.: R. H. Nicholas, director of safety; Jack Whittaker, assistant to the safety director; William Borza, B. H. Waugh, William Feick, George Whirlow, D. V. Chew, Mark Denny, Jr., Angelo Toci.

Pond Creek Colliery: Stephen Younger, safety director; B. E. Kirtner, Walter McGraner, Joe Moncho.

Rochester & Pittsburgh Coal Co.: H. D. Jones, and Robert Muir, safety engineers; E. W. Bloomquist, D. B. Carnes, W. L. Desbannet, T. E. Gerber, August Guido, D. Leiper, J. North, W. Organ.

Obituaries

Arthur S. Knoizen, 52, executive vice president and a director of the Joy Mfg. Co., died April 29 in the Franklin (Pa.) Hospital. Although suffering from a heart ailment for the past year, Mr. Knoizen's death was unexpected as his condition was reported to have improved earlier in the week. He had gone to the hospital the previous Sunday when his condition had taken a serious turn.

Mr. Knoizen was recognized throughout the industry as one of the foremost mining-machinery engineers in the country and much of the success of the Joy company resulted from his ingenuity and guidance through the years in which he came up through the ranks from a machinist-welder. He held important posts in connection with the industry and during World War II served as a dollar-a-year man as director of the mining division of the WPB. Shortly after the end of the war Mr. Knoizen was a member of a government mission to Europe for the study of the coal mining situation there.

Mr. Knoizen first joined Joy in 1923 at Evanston, Ill., when he re-



Arthur S. Knoizen

signed as shop superintendent with the Aluminum Co. of America to become associated with J. F. Joy in the new enterprise. He came to Franklin the following year as shop superintendent. He was promoted to sales and service manager for Illinois, Indiana and western Kentucky in 1927 and became sales manager for the company in 1934. He was made vice president in charge of sales in 1941 and a few years ago was elected a director and named executive vice president. Mr. Knoizen was president of the Manufacturing Div. of the American Mining Congress and a member of many mining and industrial organizations.

William Johnson, 46, mine manager, Chapman Coal Co., Edwardsville, Ill., was electrocuted April 22 while connecting a 440-v cable to a conveyor in the mine yard. Cause of the accident was not immediately determinable. Mr. Johnson became mine manager about three years ago, after he had closed the Buck Road Coal Co. mine he had founded several years previously.

John Evans, 55, Nanticoke, Pa., a fireboss for the Glen Alden Coal Co., died April 22 at the Temple University Hospital, Philadelphia. He had undergone an operation the week previously.

Lehigh Navigation Coal To Distribute Fuel Oil

Robert V. White, president, Lehigh Coal & Navigation Co., announced May 11 that a contract had been made between Lehigh Navigation Coal Co., a wholly-owned subsidiary, and Cities Service Oil Co. for the sale and distribution of all types of fuel oils for home and industrial use.

The company's staff of salesmen and retail coal dealers are now in a position to offer kerosene and Nos. 2, 5 and 6 fuel oil to fuel merchants as

well as the various sizes of anthracite coal, Mr. White said.

"Coal dealers have become fuel merchants instead of coal merchants," Mr. White pointed out. "This pattern of diversification is one that our company has followed for 128 yr. It is for that very reason that we own not only coal mines and coal lands but railroads which run through industrial regions, a network of fuel depots which sell our products, water supply companies and important water sheds, a plant for the production of Lelite which is a lightweight aggregate from waste mine materials, and Split Rock Lodge, a popular ski and vacation resort in the Pocono Mountains. Upon such diversification we have built our business.

"For the same reason our coal dealers handle oil, despite the fact that they are selling more coal now than at any time for many years. We recognize this progressive merchandising trend and believe it is part of our job to further it by using our sales force to sell fuel oils as well as coal. By doing so, we make it possible for our customers to buy more types of fuel from one supplier. This sales service is available to fuel merchants north of Washington, D. C.; in central and eastern Pennsylvania, New Jersey, New York and New England."

U.P. Coal Co. Receives 11th USBM Safety Award

With what is reported to be the finest record ever established in mine-safety history, The Union Pacific Coal Co., May 11 was awarded the 1949 Sentinels of Safety Trophy in the underground bituminous coal group by the U. S. Bureau of Mines. It is the eleventh time since entering the national competition in 1932 that the award has been won by Union Pacific Coal Co., a subsidiary of Union Pacific R.R.

At his headquarters in Omaha, Nebr., I. N. Bayless, president of the coal company, announced that the trophy was earned by the company's Reliance No. 7 mine at Reliance, Wyo., on the basis of a total work-time of 386,750 man-hours in 1949 without a lost-time injury.

The same mine won the award last year with a total of 383,888 man-hours during 1948 without a lost-time accident. According to the latest report available, the mine's unbroken record has been continued during the first three months of 1950. Man-hours worked without a lost-time accident, up to March 31, 1950, totaled 829,230.

The Sentinels of Safety Trophies are provided by the magazine, *The Explosives Engineer*, for the best safety marks established in each of six mining classifications in a national contest conducted by the U. S. Bureau of Mines.



is indispensable to the power of America

The bituminous coal industry
has the strength—the know-how—
to meet *any* challenge.

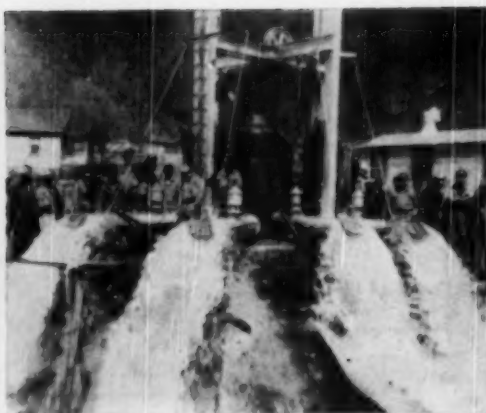
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can the greatness of America be maintained.

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SENIORS FROM THE W. VA. SCHOOL OF MINES shown at the Garden Ground tipple (left) and the centralized mine-dewatering station of The New River Co. during part of a week-long tour of West Virginia mines sponsored by the school and coal operators to give the 1950 graduating class a first-hand view of a few of the state's most interesting surface and underground operations. Making the trip were 43 seniors and three instructors from the School of Mines, which this year has the largest graduating class in its history.

Mining Seniors Visit W. Va. Mines in Week-Long Tour

WEST VIRGINIA COAL OPERATORS and their state university's School of Mines recently teamed up to give its graduating class of future mining engineers a first-hand picture of some of the state's most interesting mines.

The occasion was a week-long chartered bus tour of a half a dozen operations in the southern end of the state by 43 senior students and three instructors. It was the most extensive tour ever attempted by the School of Mines, whose 1950 graduating class is by far the largest in its history.

Object of the junket, of course, was to give the seniors a chance to see the practical application and correlation of some of the mining theories they have learned in school. Previously, the university's field trips have been much briefer, usually to mining camps near Morgantown, where the school is located.

According to G. R. Spindler, director of the School of Mines, each operation on the itinerary was visited for a particular purpose: at one it was to see how a troublesome drainage problem was being handled; at another it was to show the students how gaseous conditions were being met successfully, and so on down the list.

The week-long tour did not concern itself with underground conditions alone, because much time was spent at two modern coal-preparation plants and at Huntington, W. Va., the students were intrigued by a visit to the Bituminous Coal Research laboratory.

After spending a busy day touring an operation, the students relaxed at night when they were wined and dined by the mine owners, or, in one

or two cases, by the operators' association of that particular coal field.

To help the students know what to look for when they went underground, they were first assembled at each mine office and "briefed" by officials on what the tour at that particular operation would cover.

Among the operations visited were the Truax-Traer Coal Co.'s new preparation plant at Ceredo; the preparation plant of the U. S. Coal & Coke Co., at Gary, McDowell County; the Bartley mine of the Pond Creek Poca-hontas Coal Co.; the Caretta plant of the Olga Coal Co.; and operations of The New River Co. in Fayette and Raleigh Counties.

Mindful that the University is rendering the industry a real service in furnishing trained engineers, coal operators were most cooperative in making the trip the success it was.

It was just another one of the industry's ways of helping the School of Mines. Scholarships to the school are now being offered not only by the various operator associations in West

Virginia but by individual coal companies as well.

As a result, enrollment in mining engineering at Morgantown has shown a remarkable growth. In fact, at present there are more than 200 students enrolled—three times more than the school ever had prior to the war, Mr. Spindler points out.

Peabody Employees Win Cash for Magazine Name

Cash awards totaling \$600 were presented May 16 at a luncheon held in Springfield, Ill., to honor eight employees of the Peabody Coal Co. who submitted prize-winning names and outstanding ideas for the company's new employee magazine. The presentation was made by Stuyvesant Peabody Jr., president of the company.

The prize-winning name, "Peabody People," was submitted by the following five employees, each of whom received \$100: Warren Bacon, James A. Ghiglieri, and William Trautmann, Springfield, Ill.; Bernard P. McSherry, DuQuoin; and Ellis Edward Shaw, Taylorville. Theodore H. Lanum, DuQuoin, received a first prize of \$50 for editorial suggestions. Duplicate second prizes of \$25 for editorial suggestions went to Mrs. Gene Dial, Taylorville, and Mrs. Richard R. Hill, Ohlman.

Judges for the contest which concluded April 25, included: Hugh White, president, District 12, UMWA; Frank White, vice-president in charge of operations, Peabody Coal; and Harry M. Coleman, public-relations counsellor.

EQUIPMENT APPROVALS

Two approvals of permissible equipment were issued by the U. S. Bureau of Mines in April, as follows:

Jeffrey Mfg. Co.—Type 70UR universal cutting machine; two motors, 25 and 50 hp, 250 v, dc; Approval 2-724; April 19.

Warthington Pump & Machinery Corp.—Type 4x4 KDS pump; one 5-hp motor, 220 v, ac; Approval 2-725; April 21.

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BUTYL -Insulated Mine Power Cable for:

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- dielectric strength
- resistance to moisture
- resistance to heat
- mechanical protection
- ozone resistance

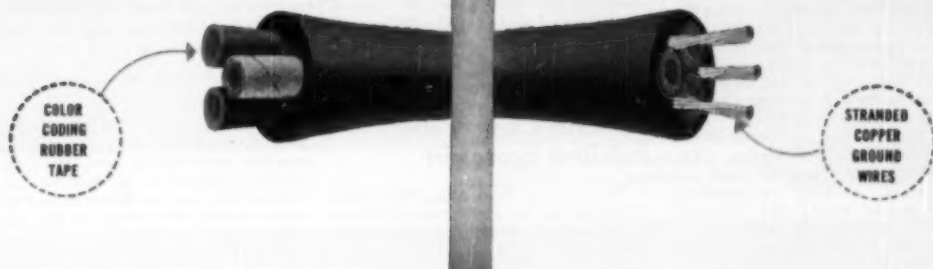
neoprene jacket (and fillers)

better than metallic armor or lead sheath because it's:

- flame resistant
- free from electrolysis
- lighter weight
- less expensive
- more flexible
- much more adaptable to mine power service conditions

and easier to splice!

Our mine service specialists can show you how this high-voltage safety cable has already saved time and cut costs in mines now using many hundreds of thousands of feet of it. They would like to show you its advantages for your mine, especially if it's mechanized. Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.



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WIRE AND CABLE



MINE AND UNION OFFICIALS, guests, and their wives, were guests of the company at the annual safety banquet of the Fleming Div., The Elk Horn Coal Corp., held at Neon, Ky.

Officials and Wives Attend Elk Horn Coal Safety Banquet

MINE SUPERVISORY OFFICIALS, UMW Local officials, company guests and their wives—totaling over 100 in all—attended the annual safety banquet of the Fleming Div. of The Elk Horn Coal Corp. Jackhorn No. 6 mine, held Sunday, April 16, in Neon, Ky.

James Fleming, safety engineer for the company, who served as toastmaster, introduced the guests present and compared the 1949 accident rate with that of 1948. Accidents in 1949 were approximately 80% less than in the previous year, he said, reporting eight lost-time accidents in 1949, compared with 42 in 1948. Jackhorn No. 6 mine did not have a single lost-time injury in 1949 from falls of roof or coal, Mr. Fleming pointed out.

The main speaker at the banquet was W. H. Tomlinson, engineer-in-charge, USBM, Norton, Va., who discussed: "Acquiring Good, Safe Habits in Coal Mining and the Education of Officials and Workmen in the Right Way to Do Their Jobs." We all acquire habits in everyday life, Mr. Tomlinson pointed out. Some are good and some are bad. Similarly, as miners we form habits and until we learn to correct the bad habits, we will continue to have accidents around our coal mines, he stated.

In a short talk, Grady Reid, safety instructor, USBM, Norton, Va., stressed the importance of labor and management working in harmony toward greater safety and more successful accident prevention.

Following a short talk on "Safety," J. H. Mosgrove, secretary-treasurer, Big Sandy-Elkhorn Coal Mining Institute, Pikeville, Ky., presented officials and workmen of Jackhorn No. 6 mine the Institute's Bronze Safety Plaque for working 3 yr, 5 mos and 14 days without a fatal accident, during which time, 1,265,870 tons of coal was mined.



SUPERVISORY AND UNION OFFICIALS posing with the Big Sandy-Elkhorn Coal Mining Institute Safety Plaque awarded Jackhorn No. 6 mine include: S. H. Tucker (left), assistant general superintendent; James Fleming, safety engineer and toastmaster at the banquet; Noah Howard, chief engineer; Roy Dailey, vice president, UMW Local 6848; Ben A. Adams, division superintendent; William Fox, chairman, safety committee, UMW Local 6848; J. H. Mosgrove, secretary-treasurer, Big Sandy-Elkhorn Institute, who made the presentation; Howard Jones, Eureka Casualty Co.; Jack Pittman, assistant mine foreman, Mine No. 6; and Ed Kincer, general mine foreman, Mine No. 6.

National Coal Appoints Full-Time Economist

The National Coal Association May 18 announced the appointment of Ford K. Edwards as director of its bureau of coal economics. Dr. Edwards, who has been associated with the Interstate Commerce Commission since 1939, was director of the ICC bureau of accounts and cost-finding at the time of his appointment.

In announcing the appointment, John D. Battle, NCA executive vice president, said: "The work of the National Coal Association has de-

veloped to the point where it requires the full-time attention of a thoroughly qualified economist to direct the association's studies in the field of economics. We feel Dr. Edwards is eminently qualified to carry on his new assignment."

The NCA executive committee, at a meeting in Washington May 9, voted to hold the association's annual convention in the spring of 1951. The committee decided that time available would not permit the necessary preparation for a convention this fall, it was reported, and since the by-laws call for a meeting in the spring of the year, it would return to that basis.

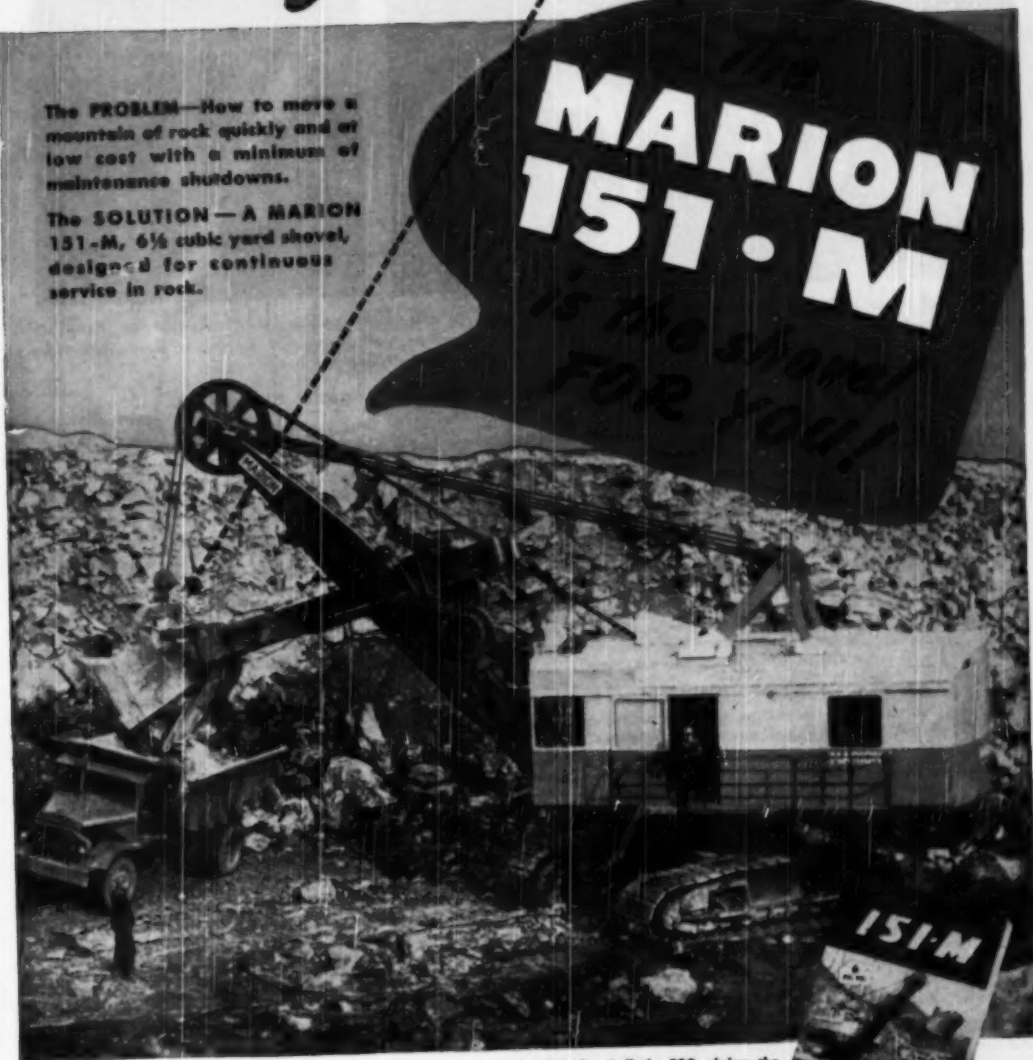
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COAL MEN ON THE JOB



ON THE JOB at the new Mine No. 40 of the Peabody Coal Co., Marco, Ill., still in development, are: William Walker (left—left photo), shift leader; Johnny Williamson, mine manager; and Guy Baggett, bottom construction foreman. A. L. Reed (left—right photo), chief electrician; and Clyde "Toots" Boyett, top foreman.

More Coal-Men-on-the-Job pictures appear on other pages in this section.

New Developments

The Valley Camp Coal Co. last month announced plans to spend \$1,000,000 during 1950 for modernization and improvement of its No. 3 mine at Triadelphia, Ohio County, W. Va. The announcement was made shortly after the opening of a new office, warehouse and mine shop, reportedly costing an estimated \$250,000. Improvements at No. 3 mine are to include a new shaft on Middle Wheeling Creek at Orrs Run, a new airshaft, fan and bathhouse. The mine is expected to be converted to an all-mechanical operation by fall, with a conveyor belt raising the coal to the surface. Some 225 new all-steel mine cars are being purchased to deliver coal from the face to the belt.

Construction of a new cleaning plant at an estimated cost of \$750,000 was scheduled to get under way early last month at the Idamay (W. Va.) operation of the Bethlehem Collieries Corp. The new plant, which is expected to be in operation by Oct. 1, is primarily designed to recover waste coal now going to the dump.

An audience of some 1,000 attended the formal opening and dedication of the new Fies mine of the Miners Coal Co., near Madisonville, Ky., May 8. Among the speakers participating in the ceremony were: Dr. A. C. Fieldner, chief of the division of fuel and explosives, USBM; Milton H. Fies, manager of coal operations, Alabama Power Co., in whose honor the mine was named; and Justin Potter, president of the Nashville Coal Co. and the Miners Coal Co. First coal was mined several months ago and when full production gets under way the property is expected to ship about 100

cars of washed coal a day and employ 300 men. A majority of the present employees are stockholders of the organization, Mr. Potter said. A barbecue and dance in the evening were part of the opening program.

The Sheridan-Wyoming Coal Co. is planning to spend \$1,000,000 on the expansion and improvement of its coal mining property at Roundup, Mont., Walter Johnson, president of the company, reportedly announced late in April. In a talk before the Lewistown Rotarians, in which he discussed the company's plans, Mr. Johnson said that the coal industry faces a bright and important future in Montana and in the nation. He also stated that labor-management relations today are the best in history.

In what is reported to be one of the few operations of its kind in Pennsylvania, the Bradford Coal Co., Bigler, Pa., is using deep-mine equipment to mine a 36-in seam in an area recently strip mined near Frenchville, Pa. Mining the Moshannon, or D, seam, under cover ranging up to 90 ft, the operation is in the first opening stage, with an entry 1,300 ft long. Rooms 300 ft long turned off the entry are equipped with chain conveyors discharging to a conveyor belt in the entry that delivers coal to a bin on the surface. To facilitate moving as each section is mined out, the surface bin, two power generators and ventilating fan are mounted on skids or otherwise designed for portability. Each section to be mined measures 1,300x600 ft and will produce about 60,000 tons. The property has about 100 acres of minable coal.

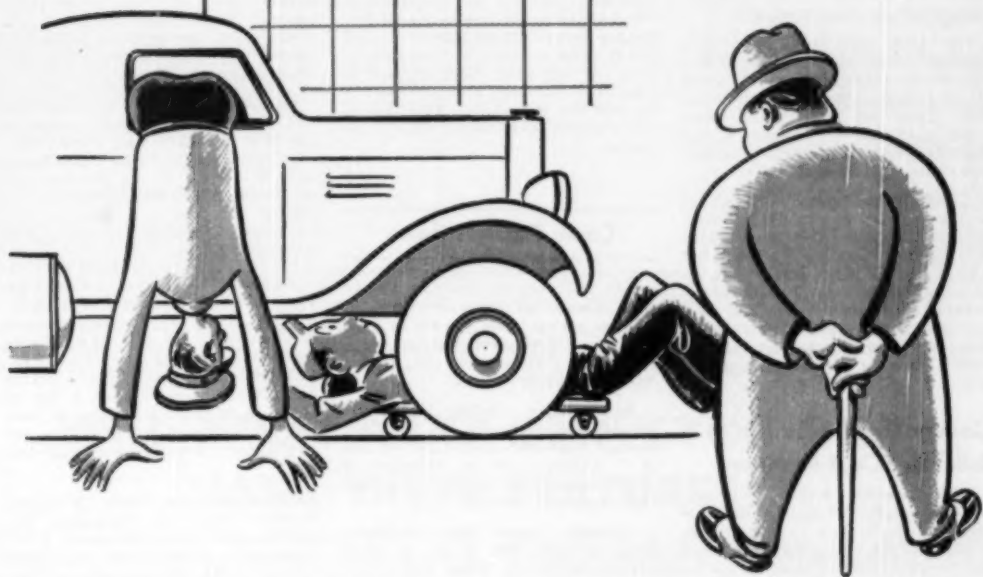
The Kaiser Steel Co. April 24 formally took over ownership and operation of the Utah Fuel Co., one of the largest producers of bituminous coal

west of the Mississippi. The company was acquired by the Book Cliffs Coal Corp., a Kaiser subsidiary, bidding and paying \$6,800,000 for the entire capital stock of 100,000 shares. The stock had been put up for public auction under a court order growing out of the reorganization of the Denver & Rio Grande Western R. R. (*Coal Age*, May, p 142). The purchase included three mines operated by Utah Fuel; Sunnyside Mine No. 2, which Utah Fuel has leased to Kaiser Steel; two mines of the Calumet Fuel Co., a Utah Fuel subsidiary, and several other subsidiary companies. For the present the company is to be operated as a unit and no major change in personnel is to be expected. Claude P. Heiner, Utah Fuel president and general manager, has been retained as a management consultant.

In commenting on the transaction and plans for the future, Henry J. Kaiser said: "The Kaiser organization will push comprehensive plans to develop the utmost potentialities of one of the nation's great areas of coal resources. Research and the latest technology of coal mining will be applied in concentrated efforts to strengthen and expand the Utah coal industry, which already has been so well advanced by the Utah Fuel Co. . . . It is the objective of the new owners to extend still further the usefulness of coal to the constantly growing industry and population of the Western States. We desire to be of continued service to the loyal customers and users of the products of the Utah Fuel Co."

Raleigh Mining Corp., Sanford, N. C., has begun an improvement and expansion program. A conveyor-belt system installed on a development basis has proved successful and will be extended throughout the mine, ac-

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"I like Fullers because I can leave them alone. Good materials,

good engineering, helical gears where they're needed, oversized bearings—boy, a Fuller piles up the miles before the driver ever chalks up that first bit of trouble for us to worry with."

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gear ratios, and plenty of stamina, to do a good job."

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cording to Ernest Bean, superintendent. A conveyor will transport coal to a central underground dump, from which it will be taken to the surface by a 4,000-ft slope hoist. New screening and washing equipment also is to be installed.

The new Pleasantville mine of the West Kentucky Coal Co., Madisonville, Ky., recently began operation. The property will have a capacity of 75 or more cars a day and is to replace the company's North Diamond mine, which has been worked out.

The Colony Coal Co. is reported to have purchased some \$200,000 of new equipment to develop new coal areas at its property near Rock Springs, Wyo. Two rock slopes to an abandoned mine now are being sunk, and the company also is planning extensive study of additional coal areas.

A coal seam averaging from 120 to 131 ft thick reportedly has been discovered in the Lake DeSmet area of Wyoming, between Sheridan and Buffalo. While some core-drill tests have been made, the exact area of the bed and the quality of the coal have not been fully determined. John E. Rice, owner of the property, is reported planning further tests of the area.

Commonwealth Edison to Build Up Coal Reserves

Commonwealth Edison, Chicago, one of the nation's largest utilities, is rushing to build up a 120-day reserve of coal and there is little likelihood of the company turning to oil or gas as substitutes for coal, Charles Y. Freeman, president, told stockholders May 23.

"Because of the uncertainty of supply and increased cost, we must look forward to a much larger investment in coal reserve," he said. Since 1946, he continued, the company had spent \$8,000,000 to buy poor-quality coal at unusually high prices in distant markets and to use high-cost substitute fuels and other expedients to stretch out the scarce supply.

About 90% of the company's fuel is coal because it is cheapest and best for the purpose, he stated. Most of its coal is mined in Illinois and last year it used about one-sixth of the state's output.

Three Island Creek Mines Closed by Violence

Some 500 miners beat two officials, routed all supervisory workers and closed three mines of the Island Creek Coal Co. in the Rockhouse area near Delbarton, W. Va., May 2. The men were protesting the furloughing of some 200 miners at two of the operations. Company officials reportedly explained that the men had been laid off by sections

rather than on a seniority basis, but said they had received no grievance complaints from union representatives.

Two days later a special grand jury indicted the head of Local 8752 and five other members on felony, assault and misdemeanor charges as a result of the flare-up. The Island Creek company also went into court, charging the six men and one other with contempt of court in that the court order issued last Feb. 7 and never dissolved had been violated by the violence. Proceedings in the case were still continuing before Mingo County Circuit Court Judge Charles W. Ferguson on May 15, and some 3,000 workers at four of the company's mines reportedly were idle at that time in protest of the contempt proceedings, it was reported.

Coal Publications

The following publications by the U. S. Bureau of Mines are available without charge upon request to Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa. All are 8x10 1/2-in.; paper; mimeo.

Accumulative Index. Synthetic Liquid Fuels Abstracts, Vol. 1-2 (New Series), 1918-1949, by J. L. Wiley and H. C. Anderson. 191 pp. Abstracts of publications listed by author, subject and numerical patent.

Synthetic Liquid Fuels Abstracts, Items 177-314, Vol. 3, No. 2 (New Series), by J. L. Wiley and H. C. Anderson. 65 pp. Abstracts of publications on gasification, Fischer-Tropsch and Bergius processes, carbonization, refining, engineering, chemistry and miscellaneous subjects, indexed by author, subject and numerical patent.

Deep-Well Pumps and Shaft Pumps in Anthracite Mines of Pennsylvania, by W. H. Lesser. R.I. 4656. 52 pp. Report on the use of deep-well and shaft pumps, prepared as part of a broad study of the anthracite mine-water problem. Applications, current practices, cost and performance records.

Solvent Extraction of Coal by Aromatic Compounds at Atmospheric Pressure, by C. Golumbic, J. B. Anderson, M. Orchin and H. H. Storch. R.I. 4662. 12 pp. Results of investigations to determine the chemical specificity of phenanthrene as a solvent and the chemical nature of the resulting extracts.

Comparison of Poisonous Gases From Permissible Explosives as Obtained in Bichel-Gage and Coal-Mine Tests, by J. E. Tiffany, E. J. Murphy and N. E. Hanna. R.I. 4663. 12 pp. Results of tests made in the Bureau's experimental coal mine to determine

composition of gases obtained under actual mining conditions. These tests were compared with Bichel-gage tests. The conclusion is that prediction of hazards based on Bichel-gage tests will err on the side of safety, because only 22% of the volume of CO formed in Bichel-gage tests was found in the mine atmosphere.

Report of Research and Technological Work on Explosives, Explosions and Flames, Fiscal Year, 1949, by Bernard Lewis. R.I. 4667. 68 pp. Summary of research and technical work conducted by the Bureau's Explosives Branch from July 1, 1948, to June 30, 1949.

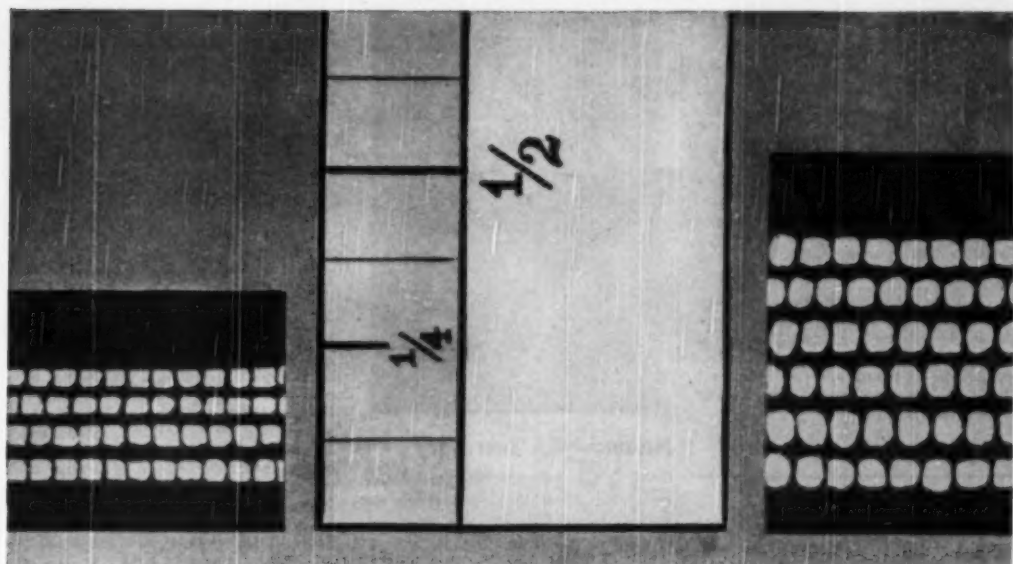
Coal-Mining Methods and Practices and Electric Power Requirements in the Bull Mountain Coal Field, Montana, by R. G. Travis and L. A. Turnbull. R.I. 4684. 27 pp. Geology and geography of the Bull Mountain field, current practices and methods, men employed, production per man and coal reserves.

Tests on the Control of Coal-Mine Fires in the Experimental Coal Mine, by John Nagy, Irving Hartmann and H. C. Howarth. R.I. 4685. 14 pp. Water was found to be the most effective extinguishing agent, with a solid stream being more effective than a fog or spray. It is possible that use of wetting agents may be helpful in extinguishing fine-coal and coal-dust fires.

Experiments on Safety of Incombustible Plugs for Stemming Explosives, by Irving Hartmann, H. C. Howarth and John Nagy. R.I. 4686. 13 pp. Under specific test conditions described in the report, incombustible stemming plugs of the design tested provided the same degree of safety as fireclay stemming of the same weight. With this incombustible plug, however, misfired charges cannot be disposed of with certainty by the procedure recommended by the manufacturer.

Recent Rock-dusting Experiments for Arresting Coal-Mine Explosions, by Irving Hartmann, John Nagy, H. C. Howarth and Abner Sachs. R.I. 4688. 16 pp. Under properly controlled conditions, bags of rock dust can be dispersed effectively by permissible explosives without igniting gas or coal dust. However, improper placement of explosives and bags does ignite gas and the Bureau does not officially endorse this method. A system wherein bag-type containers of rock dust are provided with a burster for scattering the rock dust indicates that this type of protection can suppress coal-dust explosions but tests have not proceeded to the point where the Bureau can recommend it.

The Use of Dust Respirators in Coal Mines, by S. J. Pearce, I.C. 7561. 6 pp. Instructions for the proper use of dust respirators together with a



GREATER STRENGTH of belts built with "Cordura" is illustrated above (enlarged in scale to show detail of construction). At left is cross-section of four-ply belt sinewed with "Cordura."

It's stronger than conventional six-ply belt at right, yet only half as thick. This thin, light belt is particularly desirable where panel equipment is moved frequently.

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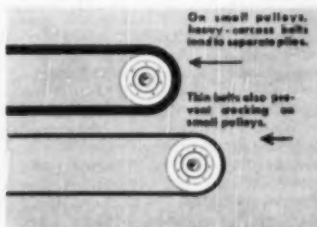
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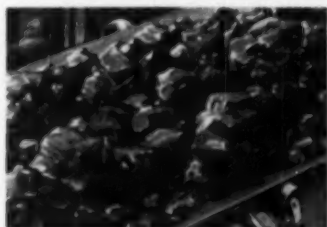
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SPAN LONGER LIFTS. The high tensile strength of "Cordura" rayon eliminates costly transfer points. For example, a belt reinforced with seven plies of "Cordura" can lift 1000 tons of overburden per hour up a 15° slope over 1000-foot centers. It has design tension of 900 pounds per inch of width.



MORE FLEXIBILITY. Belts built with "Cordura" have less tendency to crack and separate plies when run over small pulleys required in confined working space. And belts built with "Cordura" have less stretch, so less take-up room is needed. And they trough well under any loading conditions.



HEAVIER LOADING CAPACITY is possible on conveyor belts built with Du Pont "Cordura" High Tenacity Rayon. This yarn is inherently stronger than the natural fibers commonly used. It packs extra strength into conveyor belts and enables them to carry loads to the capacity of power equipment.

warning that they are no substitute for dust-control measures.

Report of the Health and Safety Division, Fiscal Year 1949, by J. J. Forbes and W. J. Fene. I.C. 7662. Summary of training courses in first aid and mine rescue for supervisors and miners, roof-support advances, prevention of dust explosions, improvement of health conditions, tests of safety equipment and communications systems, control of flood waters, improved mine inspections, and steps to control fires in inactive coal seams.

Coal for Coke Production, by A. C. Fieldner. I.C. 7659. What the Bureau is doing to stretch coking-coal reserves—reappraisals of seams, experiments in blending and washing and tests of various coals for coking characteristics.

News Briefs

Anthracite coal mines chalked up the best safety record in the industry's history in April, when only one fatality occurred for a rate of 0.11 fatalities per million man-hours worked in mining about 3,500,000 tons. A rate of 0.16 previously had been considered as the "irreducible minimum."

Neol R. Mitchell, secretary of the River-Lake Conveyor Lines, Inc., the organization planning a 130-mi cross-country conveyor belt to carry coal across Ohio, recently predicted, in a talk before the ASME, that the Ohio state legislature would approve the necessary enabling legislation next year. Laws to permit the company to secure the necessary right-of-way have previously been blocked by railroad and other interests.

The Virginia Coal Operators' Association is offering another scholarship at Virginia Polytechnic Institute, Prof. C. T. Holland, head of the Department of Mining Engineering, announced May 21. The grant is open to a Virginia resident who is a high school graduate. It pays \$300 yearly. Applications must be received by June 15 for consideration this year.

The B. & O. is planning to replace all coal-burning locomotives on its Buffalo, Rochester & Pittsburgh Div. with diesels by the middle of 1951. The line has ordered 34 diesels from General Motors at a cost of \$5,400,000.

The Hudson Coal Co. last month offered the City of Wilkes-Barre use of a tract of land in the Miners Mills section for a public playground. The property is to be leased at the nominal sum of \$1 a year, plus abatement on taxes.

The percentage of Milwaukee families using coal or coke to heat their



Named NCA Secretary

CARL C. CROWE, with the National Coal Association since 1919, last month was elected secretary of the organization, succeeding James W. Haley, who resigned earlier this year. Mr. Crowe served as assistant to the secretary and treasurer from 1919 until 1930, when he was elected assistant secretary-treasurer. He will continue to hold the post of assistant treasurer.

homes has dropped from 86 to 70.7 from 1946 to 1950, a recent survey by the *Milwaukee Journal* shows. In the same period oil use doubled from 12.4 to 25.2%, and gas use from 2.1 to 4.8%.

The Mahanoy City (Pa.) colliery, which P. & R. officials had planned to close May 1 unless output was increased, has been reprieved until at least May 27. "As April progressed, the hoist showed a continued improvement," the company announced. On April 27 it was 568 cars, 18 cars above minimum of 550 cars asked. It had been 540 cars on April 25 and the record showed that "the task set for the men is a reasonable one," the company reported.

Some 200 to 300 PMWA pickets appeared before the site of the new Farmersville, Ill., mine of the Freeman Coal Corp. early last month, protesting the use of UMWA workers at the operation. An injunction was later issued by Federal Judge Briggie, Springfield, Ill., restraining the PMWA from interfering with operation of the mine, which reportedly had signed a working agreement with the UMWA. Officials of the PMWA reportedly had previously said that they would continue to fight the issue, maintaining that they had contracts with all other mines in the area.

An appeal to the citizens of Bluefield, W. Va., "to show their loyalty to coal, the industry that is responsible for the city's very economic life, by combating an alarming local trend

toward oil for home heating" was recently made by the Bluefield Chamber of Commerce. The organization had just completed a survey that showed that 700 oil burners had been installed in the area in the last 2 yr. The Chamber recently appointed a 20-man King Coal Promotion committee to mobilize the city's full resources behind a long-range program to aid the coal industry in the area.

Association Activities

National Coal Association has elected as a member of its board of directors H. R. Hawthorne, president, Pocahontas Fuel Co., Inc., New York, succeeding the late O. L. Alexander. Members of the NCA Marketing Committee have elected as chairman of the group, H. A. Glover, president, Island Creek Coal Sales Co., Huntington, W. Va. A. R. Stock, vice president, Sinclair Coal Co., Kansas City, Mo., was elected vice chairman of the committee.

Eastern Kentucky Electrical and Mechanical Institute, at a meeting held in Pikeville, May 12, elected the following officers: President, O. J. Williams, electrical engineer, Utilities Elkhorn Coal Co.; vice president, Robert Blake, preparation-plant superintendent, Consolidation Coal Co. (Ky.); and secretary, Lee D. Siniff, mechanical and electrical engineer, Consolidation Coal Co. (Ky.).

Independent Anthracite Operators' Association, at a meeting in Wilkes-Barre, Pa., April 27, re-elected Robert L. Birtley president. Other officers elected were: Louis Pagnotti, vice president; Bruce Payne, treasurer; and L. F. Weichel, executive secretary. Elected regional vice presidents were: Joseph De Anglis, Albert Mascelli and Louis Simoncelli, Carbondale district; John A. Hart, Albert Minichiello, Stephen Dubernas, Paul Conlon, James Fedesco and Charles Adonizio, Wyoming district; George M. Crisnell, E. M. Whitney and Thomas F. Steele, Hazleton district; Ben H. Hay, E. J. Thomas, W. S. Jermyn, John E. Jones, E. P. Whitney and Ralph Lynch, Southern district.

Ohio Coal Association, at its annual meeting in Cleveland April 21, re-elected all its officers, as follows: R. L. Ireland, president; Ezra Van Horn, executive vice president; E. H. Davis, vice president; E. H. Miller, secretary-treasurer; and F. H. Boecker, assistant secretary-treasurer.

Canadian Institute of Mining and Metallurgy has elected as president Dr. A. O. Dufresne, Minister of the Department of Mines of the Province of Quebec. Dr. Dufresne has been associated with the mining industry for more than 40 yr.

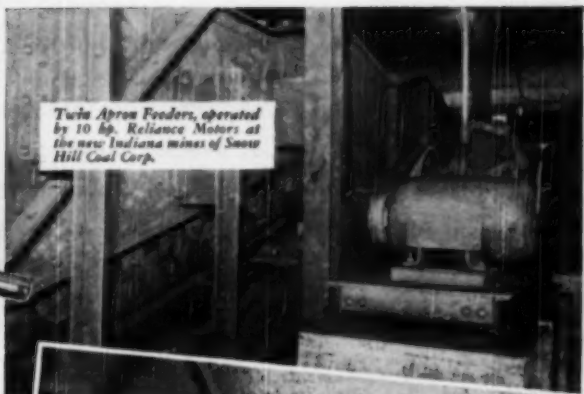
Reliance Precision-Built, Totally-enclosed, Fan-cooled A-c. Motor.



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MOTORS

Two Apron Feeders, operated by 10 hp. Reliance Motors at the new Indiana mines of Snow Hill Coal Corp.



Weigh Pan Gate operated by 15 hp. Reliance Motor at new Snow Hill mine.



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Fan-cooled Reliance *Precision-Built* Motors are found on more and more dirty jobs above ground. Here's a trend that means operators everywhere are realizing in these rugged, long-lived motors the same dependability and economy which have made Reliance Motors the Number One choice for the toughest jobs underground.

In the operation of equipment such as apron feeders, weigh pan gates, shaking and vibrating screens, washers, pumps, air tables, crushers and conveyors... Reliance *Precision-Built* Motors can offer you real help in keeping production up, costs down. Write today for Bulletin B-2101 on *Precision-Built* A-c. Motors from $\frac{3}{4}$ to 300 horsepower.

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Anthracite Conferees Look Ahead

Smoke Abatement, Crop Curing, Producer-Gas Generating and Domestic and Commercial Heating Offer Market Opportunities for Anthracite—Optimism High at 8th Annual Anthracite Conference, Lehigh University

ADDITIONAL MARKET OPPORTUNITIES for anthracite in curing agricultural products; providing generated gas as a fuel for ceramic, food, chemical and steel plants; heating in domestic and commercial applications as a result of new developments in burning equipment; and serving as a basic fuel, straight or admixed, in smoke abatement efforts were among the subjects discussed by approximately 225 anthracite men and their guests at the Eighth Annual Anthracite Conference at Lehigh University, Bethlehem, Pa., May 4. Additional topics included the state of our fuel reserves as it affects national defense, retailer recommendations for the future, and a description of a technique for evaluating fine-coal cleaning performance.

H. H. Shaver, general sales agent, Hudson Coal Co., Scranton, Pa., presided over the first morning session, and stated that the four speakers on the program would emphasize expanding market possibilities for anthracite in general and fine sizes in particular.

Clean air is as important as pure water to city dwellers, and anthracite is in a good position to assist smoke abatement because it cannot be made to smoke regardless of equipment or personnel shortcomings. E. E. Finn, director of the smoke-abatement clinic, Anthracite Institute, New York, declared in pointing out that straight anthracite or admixtures of anthracite and bituminous coal are effective in reducing smoke levels from offending installations. Noting that 2,500,000 tons of bituminous coal is now being burned in equipment suitable for anthracite in New York, and that some areas are thinking of making it illegal to use smoke-producing fuels in hand-fired burners, Mr. Finn said these increased market possibilities can be realized through cooperative selling of the smokeless nature of anthracite by producers, dealers and interested civic groups. Advising civic leaders in these matters and supporting popular demands for clean air by effective use of newspaper publicity are two tools available to the industry.

The form of smoke-control ordinances is important so that emphasis will be placed on advising and helping offenders with their problems, rather than applying fines to violators. The industry can discharge a civic duty,

improve its public relations and increase its market by assisting such counseling efforts.

Recent surveys in eastern cities show that many changes to straight anthracite or admixtures have been made or are planned, and that resulting smoke reductions indicate more efficient combustion and lower fuel costs, Mr. Finn said.

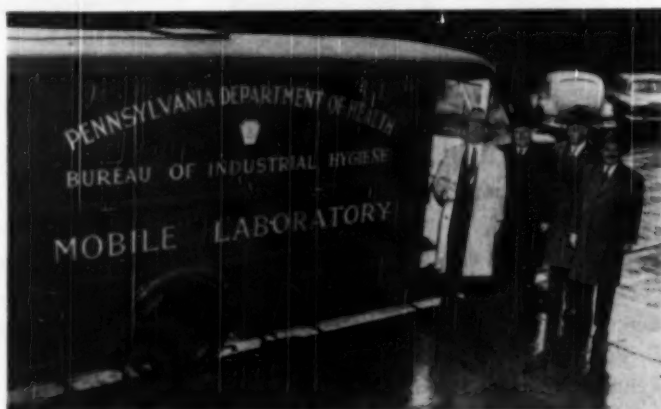
Curing agricultural products in controlled drying processes would call for 3,000,000 tons of anthracite annually in areas east of the Alleghenies if it is proved by research that such curing does not have harmful effects on the end product, Dr. O. A. Brown, senior agricultural engineer, U. S. Department of Agriculture, Oxford, N. C., said in surveying new uses for anthracite on farms. Better curing practice is now an engineering problem because rapid advances in farm machinery and farming methods have outstripped field curing, and the larger farms these advances have made possible take

great risks in exposing large crops to the uncertainties of natural curing.

Also, the national population is increasing rapidly, and all nutritional values in foods must be preserved so that available crop space can support the increased population. Natural curing loses most of the nutrients in feed crops, and agricultural experts look to controlled curing as a possible answer to the problem of maintaining quality and reducing the economic gamble in large-scale farming.

"Anthracite produces no smoke and that is a desirable characteristic," Dr. Brown said in pointing out that present scientific research to determine the effect of such drying methods on end products can be followed by engineering skill in applying anthracite to the job if research indicates that it is suitable.

Gas producers are an excellent year-around market for rice and buck sizes, Arnold Sutermeister, sales engineer, Wellman Engineering Co., New York, said in reporting that over 100 gas producers over 6 ft in diameter are installed for using anthracite in the United States, Canada and Cuba. These producers represent a total market for 700,000 tons of anthracite yearly. Producers in war plants are now idle but rated consumption by units still in operation is estimated at 400,000 tons yearly. The gas generated in these producers

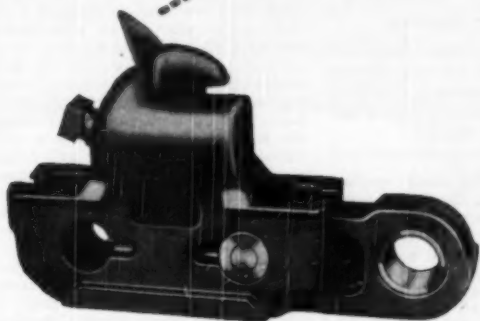


Pennsylvania Mobile Air-Pollution Laboratory in Service

AT PRESENTATION CEREMONIES in Harrisburg, the new mobile laboratory designed for air-pollution and industrial-hygiene studies and tests is inspected by Pennsylvania Gov. James H. Duff (left); George H. Deike Sr., president, Mine Safety Appliances Co., who designed and equipped the unit; Dr. Norris W. Vaux, state Health Department Secretary; and Dr. Joseph Shilen, state Industrial Hygiene Bureau director. First of its kind ever built, the laboratory has more than 25 scientific devices to collect, detect and identify air contaminants, explosive gases and other hazards. It is completely self-contained and has its own power and water supply for operation in isolated communities.



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C.F.&I. Mine Official Honored for 50-Yr Service

ROBERT BROWNRIGG (left), chief electrician and master mechanic, Frederick mine, Colorado Fuel & Iron Corp., Valdez, Colo., receives a diamond-studded pin and congratulations from H. D. Pinkney, superintendent, Morley and Frederick mines, in recognition of his 50 yr of service with the company. Mr. Brownrigg, who is planning to retire soon to enjoy a well-deserved leisure, has two sons associated with C.F.&I. coal operations.

is used in food, ceramic, metal and chemical industries, and for other applications.

"An application which should be of special interest to mining companies is the gasification of bone. This material, containing up to 60% ash, has been successfully used in anthracite gas producers, and by gasifying this bone and burning the gas under boilers a waste product can be used to replace marketable coal," Mr. Sutermeister asserted.

The advent of natural gas offers an opening for the anthracite producer where utility companies are not converting to straight natural gas but are continuing to send out mixed gases with calorific values of about 525 Btu per cu ft. Some companies use producer gas to reduce calorific values of natural gas, and although coke is used in most of these producers, anthracite would serve in many cases.

Small producer installations cannot compete with natural gas, and Mr. Sutermeister also cautioned that each increase in the cost of producer coal shortens the competitive margin at larger installations. However, plants near the anthracite region where freight rates would be low might find that anthracite producer gas is the ideal low-cost industrial fuel.

The largest anthracite stoker ever built was recently ordered by a New York State utility company, reported Carl Miller, assistant manager, industrial division, Combustion Engineering-Superheater, Inc., New York, in commenting on the fact that anthracite may find wider use in commercial markets because of burning equipment developments.

Citing reasons for many conversions to liquid fuels, Mr. Miller noted that the main objection to coal has been a high labor cost in tending boilers and handling coal and ashes. Full use of presently available automatic coal- and ash-handling equipment will reduce such costs and give anthracite an opportunity to compete in many commercial applications. Presenting slides of several improved coal-handling set-ups, Mr. Miller outlined the savings to be realized by installing inexpensive larry cars for feeding multiple burners, and the use of conveyors for getting coal to the burners and taking ashes to elevated hoppers where trucks can easily load. Selling commercial customers on the labor-cost savings possible with this equipment may prevent many future conversions to competitive fuels.

The second morning session was conducted by J. J. Tedesco, secretary-treasurer, Pagnotti Coal Interests, West Pittston, Pa., who introduced Dr. C. C. Wright, chief, Division of Fuel Technology, Pennsylvania State College, State College, Pa., who described a technique for evaluating fine-coal cleaning performance, and Dr. R. C. Johnson, vice president in charge of research, Anthracite Institute, Wilkes Barre, Pa., who surveyed developments in anthracite burning equipment.

Accurate sampling is the controlling factor in providing a reliable evaluation of any fine-coal cleaning process, Dr. Wright declared. Using projected charts and photos to show comparative results of experiments by different teams of analysts and recommended sampling methods, Dr. Wright concluded that sample-screening methods are important and that

high-ash fines should be wet-screened for accurate results, although this procedure is tedious.

Splitter sampling is the best method for sampling the cross-section of the stream in a flume, with a swing bucket cutting the full stream of the splitter discharge as the best method of taking the sample for test. Methods of reducing the sample to test size are not significant because test results following different reduction methods did not vary, Dr. Wright reported.

New design principles, established 3 yr ago, are revolutionizing anthracite burner development, Dr. Johnson said, and new units are designed to performance standards rather than by arbitrary dimensions that previously controlled burner design. Seven new boiler-burners and five new furnaces have been developed in the past 3 yr and others are in the experiment stage. Philadelphia & Reading Coal & Iron Co., Pottsville, Pa., is now designing a burner for domestic heating, with the cooperation of the institute. Dr. Johnson pointed out that the function of the institute is to lead burner-research programs and assist development efforts. He invited ideas and suggestions for a new-type unit to serve the one-floor basementless homes now being built in great numbers.

Ash-handling is a perennial objection to coal-burning domestic heaters, and floor discussion of this point in Dr. Johnson's paper brought the suggestion that dealers might remove ashes with each coal delivery. This was countered by an assertion that the practice was tried before the war but was economically impossible from the dealer's viewpoint.

The first afternoon session, presided over by C. M. Dodson, president, Weston Dodson & Co., Bethlehem, Pa., heard midwestern opportunities for anthracite outlined by G. M. Campbell, field representative, Anthracite Institute, Detroit, Mich.; and dealer recommendations for the future by R. L. Jones, president, Eastern States Retail Solid Fuel Conference.

Anthracite's market in the midwest has revived to the extent of a million tons and further substantial increases are possible, particularly with wider installation of today's automatic anthracite equipment, according to Mr. Campbell. In reporting how the Great Lakes' states market, once a heavy consumer of anthracite, could be increased, Mr. Campbell stressed six points:

1. Coal cannot escape the trend to push-button living, so development of automatic burners is of prime importance.
2. Small sizes of anthracite lend themselves to automatic handling better than do any other solid fuels.
3. Automatic heating equipment now available constitutes the best set

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Hydrotators, standard
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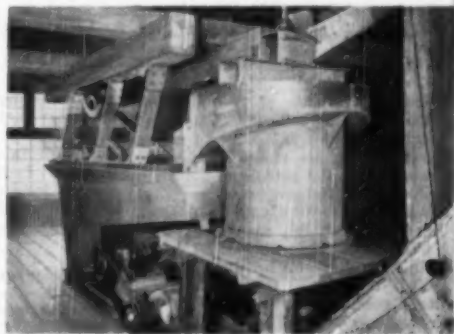
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of tools for curtailing the inroads of competitive fuels.

4. Coal in the smaller sizes required for these automatic units is abundant and will be abundant for a long time to come.

5. These small sizes are cheap.

6. They are easily handled, clean, have no degradation and are easy on equipment.

Mr. Campbell pointed out that 50,000,000 tons enter the domestic market in the midwest and anthracite has only 4% of this market. Advances can be made through a determined effort to push automatic burners.

Mistakes committed by the coal industry in the past gave fuel oil its start in the domestic heating market, Mr. Jones said in reviewing the fact that poor action or lack of action, and not inferiority of product, permitted competitive inroads.

As remedies Mr. Jones recommended operator initiative in securing peace in the industry, better understanding between retailer and producer through frequent meetings and discussions, and improved public acceptance of product through all public relations media and simple, low-cost, easily maintained, automatic equipment.

The final session was conducted by F. W. Earnest Jr., president, Anthracite Institute, Wilkes Barre, Pa., and the program consisted of a paper, "Our Fuel Resources and the National Defense," by Roderick Stephens, president, R. Stephens & Associates, New York; and a symposium on new domestic heating units by F. Kalmbach Jr., president, General Machine Co., Emmaus, Pa.; R. A. Haggerty, general sales manager, Hershey Machine & Foundry Co., Manheim, Pa.; P. L. Gross, owner, Coal-O-Matic Co., Truckville, Pa., and J. E. Axemann, partner, Axemann-Anderson Co., Williamsport, Pa.

National defense is in jeopardy for lack of authoritative knowledge of what our oil and gas reserves amount to, Mr. Stephens warned, and without such basic information, he said, no intelligent estimate of the situation can be made by military authorities. Aviation, marine, railroad and motor transportation are almost wholly dependent upon the petroleum industry. They cannot be converted to other fuels in the event of war, and since they would be high on priority lists it is doubtful that sufficient oil would be left for domestic heating.

Mr. Stephens cited several examples of conflicting estimates of "proven reserves" of oil and gas from petroleum-industry sources in recommending active support of Senate Resolution 239, introduced by Senator Francis J. Myers (D., Pa.), which would provide for a Senate inquiry into the nation's fuel reserves, with the aim of formulating an overall domestic fuel policy. The Myers resolution, Mr. Stephens said, was aimed at the heart of the problem, and he

expressed the view that it had an excellent chance of speedy passage.

We do have authoritative estimates of reserves of anthracite and bituminous coal, but there is no such information on oil and gas. "The possibility of World War III is not so remote that we need not concern ourselves with these problems," Mr. Stephens concluded.

Engineering features and sales advantages of new anthracite burners were presented by the representatives of manufacturers. Actual models of the newest types were on the floor for inspection.

Simplicity in design, accessibility for maintenance, automatic control and lowest-possible cost were features of each of the new units. Consensus of the speakers was that lower prices will come with higher sales volume.

Professor A. C. Callen, head, Department of Mining Engineering, Lehigh University, and chairman of the conference committee, concluded the meeting with a summary of the proceedings and stated that more optimism was exhibited at this conference than at any of the previous seven.

Preparation Facilities

Lehigh Navigation Coal Co., Tamaqua, Pa.—Contract closed with Wilmot Engineering Co. for one 6-ft-diameter Hydrotator to prepare buckwheat No. 4 coal; feed capacity, 50 tph.

Pennsylvania Coal Co., Minersville, Pa.—Contract closed with Wilmot Engineering Co. for one 2½-ft-diameter Hydrotator to prepare rice coal; feed capacity, 18 tph.

Rhodes Contracting Co., Ashland, Pa.—Contract closed with Wilmot Engineering Co. for construction of a complete fine-coal cleaning plant with the following equipment: one 7-ft-diameter Hydrotator for barley coal, feed capacity, 75 tph; one 7-ft-diameter Hydrotator for No. 4 coal, feed capacity, 70 tph; and one 12-ft-diameter Hydrotator-Classifer oil-flotation unit to prepare minus 3/64-in to plus 100-mesh fine coal, feed capacity, 45 tph.

Hallidayboro Coal Co., Inc., Elkhart, Ill.—Contract closed with Western Machinery Co. for one No. 3C Wemco Mobil-Mill to clean 60 tph of 4x½-in coal.

Powell Coal Co., Kittanning, Pa.—Contract closed with Western Machinery Co. for installation of one No. 3C Wemco Mobil-Mill to clean 60 tph of 4-inx10-mesh coal feed, plus design and construction of feeding, conveying, crushing and screening facilities.

Trotter Coal Co., Morgantown, W. Va.—Contract closed with Jeffrey Mfg. Co. (by Interstate Engineering & Construction Co.) for one two-compartment diaphragm jig; capacity, 150 tph, 4x½-in coal.

Trotter Coal Co., Bunker mine, Cassville, W. Va.—Shipment by Deister Concentrator Co. of four SuperDuty Diagonal-Deck No. 7 coal-washing tables for cleaning 1¼x0-in coal and one four-way-split Model 109 Concenco revolving feed distributor.

Lehigh Navigation Coal Co., Tamaqua, Pa.—Shipment by Deister Concentrator Co. of two SuperDuty Diagonal-Deck coal-washing tables for treating No. 5 buck anthracite.

Rosini Bros., Shamokin, Pa.—Shipment by Deister Concentrator Co. of two SuperDuty Diagonal-Deck No. 7 coal-washing tables for cleaning rice and No. 4 buck anthracite.

Mid-Continent Coal Corp., Green Diamond mine, Marissa, Ill.—Shipment by Deister Concentrator Co. of two SuperDuty Diagonal-Deck No. 7 coal-washing tables for cleaning ¾x0-in fines.

Black Diamond Coal Mining Co., Sipsey, Ala.—Shipment by Deister Concentrator Co. of one Model 105 Concenco revolving feed distributor, eight-way split.

Tregoning Coal Co., Cartersville, Ill.—Shipment by Deister Concentrator Co. of one Leahy heavy duty vibrating screen, double surface, for sizing stoker coal.

Hanna Coal Co., Georgetown No. 12 mine, Georgetown, Ohio—Shipment by Deister Concentrator Co. of eight SuperDuty Diagonal-Deck No. 7 coal-washing tables (plant to contain total of 29 SuperDuty Diagonal-Deck No. 7 coal-washing tables and six Concenco revolving feed distributors).

W. Va. University Holds Coal Economics Meeting

More than 200 coal operators and interested members of the public attended a meeting to discuss the economics of the coal industry, held at West Virginia University, Morgantown, May 5. The program was arranged and sponsored by the university's Department of Economics and Business Administration.

One of the main speakers for the occasion was Dr. C. J. Potter, president, Rochester & Pittsburgh Coal Co., who discussed "The Competitive Position of the Coal Industry." D. L. McElroy, vice president, Pittsburgh Consolidation Coal Co., spoke on "The Correlation of Production and Sales Operations." J. E. Tobey, president, Appalachian Coals, Inc., acted as chairman of the meeting.

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Holmes Association Makes Safety Awards

In recognition of individual deeds of heroism in saving life in mines and plants of the mineral industries during the past year, the Joseph A. Holmes Safety Association has approved five Medals of Honor, James Boyd, Director of the Bureau of Mines and president of the Association, announced late in April. The Association also approved 277 Certificates of Honor in recognition of outstanding contributions to safety in the mineral industries of the United States.

Approval of these awards was voted by the Association at its annual meeting April 18, in Washington, D. C. The award winners were selected from more than 500 recommendations received during the year from operating companies, national associations, and individuals. The organization was formed in 1916 to commemorate and further the work of the late Dr. Joseph Austin Holmes, first Director of the Bureau of Mines. The Director of the Bureau, which sponsors the association's program, is president of the organization by virtue of his office.

For exceptional safety records and outstanding success in supervisory work the 277 Certificates of Honor approved, included 41 for presentation to individuals associated with coal mines and 75 for coal mines and companies.

Maize and Walsh Honored

Certificates of Honor were also awarded to Richard Maize, Secretary, Pennsylvania Department of Mines, and to Joseph J. Walsh, Deputy Secretary of the Pennsylvania Department of Mines for anthracite. Under Mr. Maize's leadership, it was noted, the fatality and accident rates in the coal mines of Pennsylvania were greatly reduced—from 1.19 per million man-hours in 1940 to .56 for 1949 in bituminous mines, and from 1.50 in 1940 to .85 for 1949 in anthracite mines.

Mr. Walsh was cited also for outstanding leadership in the safety movement in the Pennsylvania coal mines for more than 45 yr. He served as state mine inspector from 1905 to 1923, as chief of the department 1923 to 1927, and as Deputy Secretary of the Anthracite Section since 1927.

Three of the five men awarded Medals of Honor for risking their lives to save others were coal miners. Michael Dobson, 53, Lavelle, Pa., on Feb. 1 of this year entered a gas-filled pillar hole at the Reliance colliery of the Philadelphia and Reading Coal & Iron Co., at Mt. Carmel, Pa., and saved Nicholas Amato, a fellow miner from suffocation. He failed after numerous attempts to rescue Stephen Venarchick.

Ellis Bowman, 53, on May 12, 1949,

at great personal risk climbed over the tops of several cars of a moving man-trip in the Elkhorn Coal Co.'s No. 2 mine, Kona, Ky., after the motorman had been thrown off and injured. He kept the trip from running out of control down a grade, thus saving the 22 other passengers from possible injury or death.

Jerome Hernandez, 25, Sunnyside, Utah, another coal miner, knowingly risked his life in the Kaiser No. 2 mine, Sunnyside, Utah, June 22, 1949, to rescue a fellow worker, Pete Stoyanoff, who had been pinned against a loading machine by a roof fall. The roof was still working when Hernandez ran to Stoyanoff's aid.

All officers of the association were reelected. Dr. Boyd announced that standing committee appointments would be made later. The Association also lowered qualification for Certificates of Honor for individuals, from 45 yr of service without lost-time accidents to 40 yr.

41 Individuals Cited

The following individuals were awarded Certificates of Honor by the Council of the Association for promoting safety in coal mining and for supervising the work of others:

W. B. Hays, Amherst Coal Co., Amherstdale, W. Va., for supervising

an average of 568 employees in the Amherst Mines 1-A, 1-B, 1-C, and No. 4, for a total of 5,071,798 man-hours in the production of 3,963,749 tons of coal.

George Ribby, Banning mine, Republic Steel Corp., Belle Vernon, Pa., for supervising an underground crew of 25 without a lost-time accident for 1,087 working days, a total of 240,725 man-hours.

R. G. Blackwell, Mulga mine, Woodward Iron Co., Mulga, Ala., for supervising a section crew without a lost-time accident from Sept. 29, 1944, to Jan. 1, 1950, a total of 255,286 man-hours.

Ed Campbell, general night foreman, Pond Creek Poca-hontas Co., Bartley, W. Va., for supervising employees without a lost-time accident from Nov. 1, 1945, to Dec. 1, 1949, a total of 308,160 man-hours.

Berkley Clear, Pond Creek Poca-hontas Co., Bartley, W. Va., for supervising a tippie crew without a lost-time accident from Jan. 1, 1946, to Dec. 1, 1949, a total of 269,640 man-hours.

Oliver Cope, Banning mine, Republic Steel Corp., Belle Vernon, Pa., for supervising a crew of 16 without a lost-time accident from July 1, 1935, to Jan. 1, 1950, a total of 3,499 work days or 501,392 man-hours.

W. H. Jayne, Armco Steel Co., Middletown, Ohio, for working in coal mines in various occupations for 47 yr without a disabling injury.

Ade Cunningham, Armco Steel Corp., Middletown, Ohio, for working in and around coal mines for 53 yr without a disabling injury.

Thomas Edwards, Kingston, Pa., for working 64 yr in anthracite mines with The Hudson Coal Co., without suffering a lost-time injury.

J. M. Farley, Pond Creek Poca-hontas Co., Bartley, W. Va., for supervising employee activities without a lost-time accident from July 19, 1947, to June 26, 1949, a total of 301,080 man-hours.

William Parisi, Pittsburgh Coal Co., Library, Pa., for supervising 560 employees in the production of 1,707,847 tons of coal (2,601,770 man-hours) without a fatality.

N. M. Martin, Clinchmore, Tenn., for working in coal mines in Virginia and metal mines in Tennessee 50 yr without incurring a lost-time injury.

George McClafferty, Russellton mine, Republic Steel Corp., Indianola, Pa., for supervising a tippie crew without a lost-time accident from Sept. 1, 1943, to Jan. 1, 1950, a total of 1,496 working days.

George McPhee, The New River Co., Lochgelly, W. Va., for working

MEETINGS

• American Retail Coal Association: annual meeting, June 13-14, St. Louis, Mo.

• Stoker Mfrs. Association: annual meeting, June 15, LaSalle Hotel, Chicago.

• Rocky Mountain Coal Mining Institute: annual meeting, June 19-21, Hotel Colorado, Glenwood Springs, Colo.

• Mining Society of Nova Scotia: annual meeting, June 26-27, Cornwallis Inn, Kentville, N. S., Canada.

• West Virginia Coal Mining Institute, Central Appalachian Section and Coal Division, AIME: joint spring meeting, June 16-17, Daniel Boone Hotel, Charleston, W. Va.

• Midwest Stoker Association: annual summer outing and golf tournament, July 28, Mt. Prospect Country Club, Mt. Prospect, Ill.

• ASME: semi-annual meeting, June 19-23, Hotel Stetler, St. Louis, Mo.

• Southern Appalachian Industrial Exhibit: Aug. 16-19, Bluefield, W. Va.

in Pennsylvania and West Virginia coal mines more than 58 yr without a lost-time injury.

Fred E. Middleton, Tunnelton, W. Va., for having worked in the coal mines of Pennsylvania and West Virginia 51 yr without a lost-time injury.

Exra Norrison, Huntington, Utah, for having worked in coal mines more than 44 yr without incurring a lost-time injury.

Charles L. O'Brien, Indianola mine, Republic Steel Corp., Indianola, Pa., for supervising an underground crew without a lost-time accident from Feb. 15, 1947, to Jan. 1, 1950, a total of 628 working days or 200,332 man-hours.

Ralph O'Brien, Banning mine, Republic Steel Corp., Smithton, Pa., for supervising 66 employees in operation of a cleaning plant without a lost-time accident for 598 working days or 345,048 man-hours.

The 114 foremen of the Red Jacket Coal Corp., Red Jacket, W. Va., who during 1949 supervised sections producing 930,419 tons of coal (1,368,830 man-hours) without a lost-time accident.

John Edward Patterson, Beelick Knob, W. Va., for having worked in West Virginia coal mines 51 yr (1893-1944) without suffering a lost-time injury.

William Muncie Ratliff, Bellwood, W. Va., for working in the coal mines

of West Virginia 54 yr without a lost-time injury.

A. Foster Rodeheaver, Maureen Coal Co., Shinnston, W. Va., for supervising employees of the Cliff mine without a fatality from Jan. 1, 1923, to Jan. 1, 1950, in the production of 2,438,774 tons of coal.

John Shaynak, Crescent No. 2 mine, Republic Steel Corp., Charleroi, Pa., for supervising an underground crew 1,629 working days or 216,880 man-hours (Feb. 28, 1943, to Jan. 1, 1950) without a lost-time accident.

Ted Simpkins, Republic mine, Republic Steel Corp., Pikeville, Ky., for supervising an underground crew 1,361 working days or 259,555 man-hours (March 10, 1944, to Jan. 1,

COAL MEN ON THE JOB



AT THE LEW ANN MINE of the Lew Ann Coal Co., Crawley, W. Va., officials include: John Patterson (left), general mine foreman; James Willard, night mine foreman; Arthur Persinger and Ralph Bragg, electrician.



SUPERVISORS AT MINE NO. 8 of the Leckie Smokeless Coal Co., Anjean, W. Va., include: Elza Rudd (left) and Bruce White, section foremen; A. O. Taylor, night mine foreman; and A. A. Taylor, section foreman.



AYRSHIRE COLLIERIES CO. PERSONNEL: Raymond Pyle (left—left photo), superintendent, Chinook mine, Brazil, Ind.; Webb Endicott, assistant general superintendent, and Angus Bain, mechanical engineer, Indianapolis. J. J. Merle (left—right photo), assistant preparation manager, Indianapolis; Floyd Weaver, laboratory technologist, Guinn Neely, assistant tipple foreman, and E. M. Baker, superintendent, Delta mine, Marion, Ill.



More Coal-Men-on-the-Job pictures appear on other pages in this section.

1950) without a lost-time accident.

Gustave D. Speicher, Plymouth, Pa., for having worked in and around anthracite mines 68 yr (1881-1949) without incurring a lost-time injury.

James Monroe Ward, Oliver Springs, Tenn., for working in Tennessee coal mines 51 yr without a lost-time accident.

James Watson, Rochester & Pittsburgh Coal Co., Four States, W. Va., for working in West Virginia and Pennsylvania coal mines continuously for 41 yr without a lost-time accident and experiencing only one lost-time accident in 56 yr.

Evan B. Williams, Carbondale R. D., (Newton Lake), Pa., for having worked 54 yr in anthracite mines without a lost-time injury.

George P. Anderson, Bethlehem Collieries Corp., Marianna, Pa., for supervising, without a fatality, the mining of 1,486,000 tons of coal, between Aug. 1, 1930 and Feb. 1, 1950, (2,784,000 man-hours); and without a lost-time accident occurring to workmen under his supervision since June 23, 1947.

John W. Williams, Bethlehem Collieries Corp., (W. Va.), Fairmont, W. Va., for supervising an underground crew in Mine No. 41 from Feb. 1, 1940, to Feb. 28, 1950, a total of 920,931 man-hours, without a fatality.

Rex Longridge, Bethlehem Collieries Corp., (W. Va.), Morgantown, W. Va., for supervising an average of 336 employees without a fatality from March 14, 1944, to Jan. 1, 1950, a total of 3,528,927 man-hours, while producing 2,160,660 tons of coal.

Orma A. Shaffer, Bethlehem Collieries Corp., (W. Va.), Dellslow, W. Va., for working as a machinist around coal mines 43 yr without a lost-time accident.

C. A. Manning, Bethlehem Collieries Corp., (W. Va.), Dellslow, W. Va., for working without a lost-time injury in coal mines for more than 40 yr.

Tracy C. Armstrong, Tennessee Coal, Iron & R.R. Co., Birmingham, Ala., for supervising a washer crew of 18 without a lost-time accident from Dec. 1, 1938 to Jan. 31, 1950, a total of 270,510 man-hours.

Thomas R. Mills, Tennessee Coal, Iron & R.R. Co., Birmingham, Ala., for supervising a crew of 16 from Oct. 16, 1938, to Jan. 31, 1950, a total of 251,129 man-hours, without a lost-time injury.

Albert E. Smith, Bethlehem Collieries Corp., (W. Va.), Barrackville, W. Va., for supervising 20 underground employees in Mine No. 41 without a fatality from May 25, 1933, to Feb. 23, 1950, a total of 1,695,087 man-hours.

Joseph Petruniak, Patton, Pa., for working more than 41 yr in bituminous coal and clay mines of Pennsylvania without a lost-time accident.

William Johnson, Patton, Pa., for

working in Pennsylvania bituminous-coal and clay mines over 41 yr without a lost-time accident.

John Micklick, Patton, Pa., for working in Pennsylvania bituminous-coal and clay mines more than 43 yr without a lost-time accident.

William Nelson, Patton, Pa., for working in bituminous-coal and clay mines of Pennsylvania 56 yr (1894 to 1950) without a lost-time accident.

James Blake, Patton, Pa., for working 58 yr in Pennsylvania bituminous-coal and clay mines (1892 to 1950) without a lost-time accident.

Mine Records Recognized

Certificates of Honor for notable achievements in safety were awarded to the following coal mines and mining companies:

Alabama By-Products Corp.: Barney mine, Cordova, Ala.; Bradford mine, Dixiana, Ala.; Labuco mine, Labuco, Ala.; Praco mine, Praco, Ala.; and Samoset mine, Dora, Ala.

Amherst Coal Co.: Amherst Nos. 1A, 1B and 1C mines, Amherstdale, W. Va.

Logan County Coal Corp.: Lundale mine, Lundale, W. Va.

Bethlehem Collieries Corp.: Ellsworth Div., Ellsworth, Pa.; Mine No. 53, Cokesburg, Pa.; and Mine No. 51, Ellsworth, Pa.

Minds Coal Mining Corp.: Golden Ridge No. 92 mine, Monterville, W. Va.

Bunker Hill Coal & Mining Co.: Bunker Hill mine, Collinsville, Ill.

Blue Diamond Coal Co.: Blue Diamond mine, Blue Diamond, Ky.; and Leatherwood mine, Leatherwood, Ky.

Butler Junction Coal Co.: Butler Junction mine, Freeport, Pa.

Colorado Fuel & Iron Corp.: six coal mines, Denver, Colo.; Kebler mine, Tioga, Colo.; Morley mine, Morley, Colo.; Frederick mine, Valdez, Colo.; and Pictou mine, Walensburg, Colo.

Consolidation Coal Co. (W. Va.): Mine No. 25, Clarksburg, W. Va.; No. 38, Fairmont; No. 63, Monongah; No. 93, Jordan; and No. 97, Rivesville.

DeAngelis Coal Co.: Bolands colliery, Carbondale, Pa.

Geneva Steel Co.: Geneva coal mine, Horse Canyon, Utah.

Hutchinson Coal Co.: McCandlish mine, Meadowbrook, W. Va.

Island Creek Coal Co.: Nos. 1 and 7 mines, Holden, W. Va.; No. 15 mine,

Verdunville, W. Va.; and No. 24, Ragland, W. Va.

Jamison Coal & Coke Co.: Jamison No. 2 mine, Hannastown, Pa.

Johnstown Coal & Coke Co.: Crichton No. 1 mine, Crichton, W. Va.

Livingston-Mt. Olive Coal Co.: Livingston No. 1 mine, Livingston, Ill.

Maureen Coal Co.: Cliff mine, Spelter, W. Va.

Midwest-Radiant Corp.: No. 1 mine (strip), Millstadt, Ill.

Orlandi Coal Co., Ashford, W. Va.

Peabody Coal Co.: No. 58 mine, Taylorville, Ill.

Pittsburgh Coal Co.: Crescent mine, Daisytown, Pa.; Mongah and Montour No. 10 mines, Library, Pa.

Puritan Coal Corp.: Thacker No. 1 mine, Puritan Mines, W. Va.

Red Jacket Coal Corp.: Junior and No. 5 mines, Red Jacket, W. Va.

Reitz Coal Co.: Reitz No. 3 Upper, 3B, 4 and 5 mines, Windber, Pa.

Republic Steel Corp.: Banning mine, Belle Vernon, Pa.; Crescent No. 2 mine, Charleroi, Pa.; and Indianola mine, Indianola, Pa.

The Spruce River Coal Co., Ramage, W. Va.

St. Louis & O'Fallon Coal Co.: Black Eagle No. 2 mine, Belleville, Ill.

Superior Coal Co.: No. 4 mine, Willsontville, Ill.; No. 3 mine, Mt. Clare, Ill.; and No. 1 mine, Eagarville, Ill.

The Union Pacific Coal Co.: Reliance No. 7 mine, Reliance, Wyo.; Stansbury mine 7½ Seam, Stansbury, Wyo.; Winton No. 7½ mine, Winton, Wyo.; and Superior D. O. Clark mine, Nos. 9 and 15 Seams, Superior, Wyo.

Tennessee Coal, Iron & R.R. Co.: Short Creek mine, Adamsville, Ala.; and Hamilton mine, Pratt City, Ala.; and

West Virginia Coal & Coke Corp.: Norton No. 2 mine, Norton, W. Va.

Woodward Iron Co.: Mulga mine, Mulga, Ala.

Stonage Coal & Coke Co., Big Stone Gap, Va., and the following mines: Stonage colliery, Stonage, Va.; Derby Colliery and Roda No. 5 mine, Roda, Va.

Clearfield Bituminous Coal Corp., Indiana, Pa., and the following mines: Dutch Run mine, Alverdale, Pa.; Commodore mine, Commodore, Pa.; and Clymer No. 2 mine, Clymer, Pa.

Eastern Gas & Fuel Associates: Kopperston No. 1 mine, Kopperston, W. Va.; Federal No. 1 mine, Grant Town, W. Va.; and Keystone mine, Keystone, W. Va.

News of Your Organization Is Welcome, Too!

MANY COAL-MINING COMPANIES make it a point to write us personal changes on their staff for inclusion in COAL AGE'S "Personal Notes" section, as well as other news of their company, such as new mine developments, safety and production achievements, annual staff functions, etc.,

accompanied by pictures where suitable and available. You, too, are invited to write us whenever the occasion arises—it takes only a minute. Job changes from the individuals concerned also are welcome. Address: News Editor, COAL AGE, 330 West 42nd St., New York 18, N. Y.

"GUILLOTINE" TEST Proves 50% MORE CUSHION in *Homocord* CONVEYOR BELTS



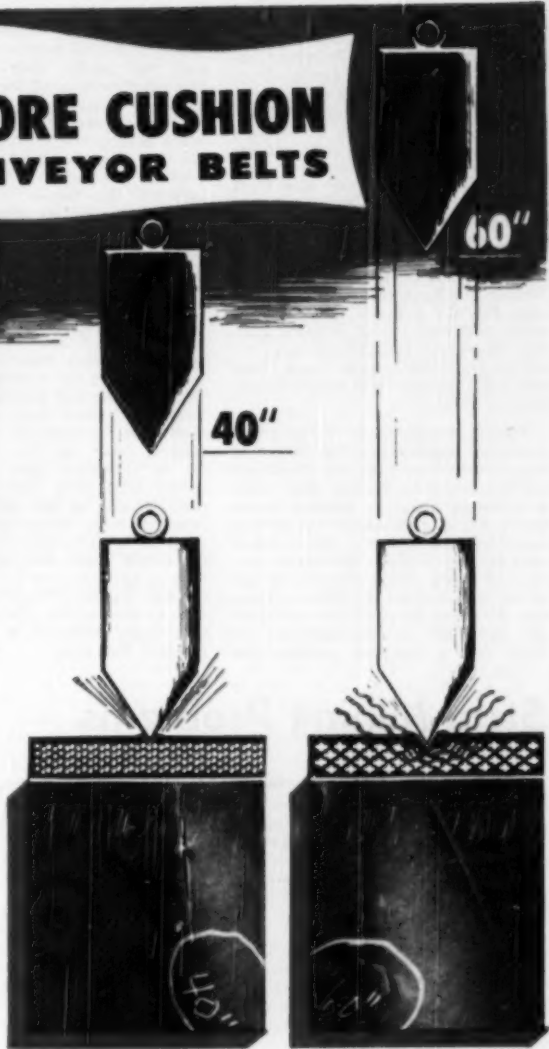
When rocks like those shown here drop on a conveyor belt, every shock at loading point shortens the life of the belt. To overcome this, extreme cushion and resilience are built into Homocord Conveyor Belts. This "Through-and-Through" Cushion gives Homocord Conveyor Belts longer life than any other belt.

To measure comparative cushion and shock-absorbing qualities, Raybestos-Manhattan engineers devised the "killer" test shown at right. A heavy metal weight, ground to a blunt edge is dropped from various measured heights until it ruptures the cover of the sample under test.

Notice the shock lines indicate how a regular conveyor belt's "boardy" resistance to impact leads to cover gouging and breakdown. The shock lines on the Homocord cross section show how "Through-and-Through" cushion and resilience of the Homocords absorb impact without injury.

Homocord CUSHIONED CONSTRUCTION HAS 8 ADVANTAGES

1. Complete bonding of every member into a homogeneous structure.
2. Holds metal fasteners, with no loss of draw-bar strength.
3. Lateral flexibility permits perfect troughing, accurate training, reduces fatigue of flexing at bend in troughing idlers.
4. Resists destructive action of continuous or heavy impact feeding.
5. Cushion Homocord body and low inelastic stretch reduce wear and tear of top cover.
6. Homocord body reduces hazard of punctures.
7. The Homocords are completely encased in Flexlastics; moisture not admitted, mildew cannot start.
8. Longer life, lower cost per ton.



REGULAR DUCK BELT

Unretouched photo shows actual rupture results of a 40" Guillotine Drop Test on a conventional 4-ply 32-oz. duck belt with 1/8" top cover, 1/16" bottom cover. With little cushion to absorb impact, the cover ruptures and deterioration sets in.

Homocord

Unretouched photo shows comparable degree of impact effect from a 60" Guillotine Drop Test on a 4-ply AEH Homocord Conveyor Belt with 1/8" top cover and 1/16" bottom cover. Impact of falling weight is dissipated through the Homocords, cushioned in Flexlastics.

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(Continued from page 91)

close inspection, roof bolting should not be attempted. Improperly installed bolts are as dangerous as no support at all, because such installations give a false sense of security.

"Remember the quality of the roof between the last row of bolts and the face is an unknown factor until it is actually secured. Anyone who must work in this area—including the roof bolting crew—should be protected by safety posts or jacks.

"Before selecting an untried type of bolt, the manufacturer should be required to demonstrate its effectiveness for roof support. Be sure that bolts purchased are of uniform quality. Numerous bolt failures have resulted from using bolts made from rerolled scrap steel that was not heat-treated properly."

Bolting Drills—T. H. Troller, vice president, engineering, Joy Mfg. Co., supplemented his paper on "Mechanical Equipment for Roof Bolting" with a series of slides of drilling equipments for a wide variety of mining conditions, including a dust-control unit for dry drilling. The latter consists of a cup surrounding the mouth of the hole, and an air injector carrying the dust to a cyclone collector and cloth filter on the discharge, all built into a compact package for

use on a small portable drill rig. "Rotary drills," he said, "are preferred where the nature of the burden rock will permit their application."

One disadvantage is the difficulty of including a hammering mechanism to set slot-and-wedge type bolts. Diamond drilling will penetrate hard rock but the cost is prohibitive. Consequently, percussion drills are necessary and this means compressed air because as yet, "no universally suitable electrically-operated and widely accepted drills for this class of service are on the market." Development, however, may bring electric or hydraulic-electric tools suitable for percussion drilling. Air percussion drills require about 8 times as much source power as electric rotary drilling.

Speaking of the development of instruments for roof bolting determinations and inspections, Mr. Troller showed a photograph of a novel gadget made by the Ohio Brass Co. to determine hole diameter. A hollow tube with three spring-suspended balls on the end is pushed into the hole. Measurement of the diameter is by forcing a cone up into the center space between balls. The cone is carried on a rod that slides through the tube. Position of the rod with respect to the tube, as indicated by a scale calibrated in inches, tells the hole diameter.

chines and cleaning plant and then prorating the charges on the basis of these meter readings.

Grounding 440-V Circuits — Increased safety for personnel working with strip-mine auxiliary equipment operated at 440-v can be had through effective grounding of such equipment by a system similar to that used on larger 4,160-v installations. Mr. Briscoe stated. This "derived-neutral system" in the 4,160-v application consists of a grounding transformer for establishing a true neutral on delta-connected transformer secondary circuits, a suitable resistor and relay connected between the true neutral of the ground transformer and the 4-kv neutral, and a metallic connection of low resistance between the motor frame of the portable equipment and the ground connection side of the neutral ground resistor.

Mr. Briscoe outlined field tests of this system as conducted by a committee of electrical engineers sponsored by the Open Pit Mining Association. Test results proved that the system is satisfactory and affords protection against shocks resulting from faults in windings and controls on 440-v motors on portable pit equipment. Lightning voltages, phase-to-ground faults, personal contact with exposed phase conductor, and difficulty in locating cable faults are possible drawbacks in applying the system, Mr. Briscoe declared. He concluded that education of operating personnel to insure safe handling of the system is necessary as in all other new applications.

Strip-Mining Problems

POWER DISTRIBUTION, grounding practice, blasting vibrations and radio communication received the attention of strip-mining men Monday afternoon. The program and speakers were: "Analysis of Power Requirements for Strip Mines," Maurice L. Quinn, chief electrical engineer, Sinclair Coal Co., St. Louis, Mo.; "Grounding 440-V Circuits in Open Pit Mines," L. E. Briscoe, electrical engineer, Ayrshire Collieries Corp., Indianapolis, Ind.; "Vibrations from Heavy Overburden Blasting," L. Don Leet, seismologist, Harvard University Seismograph Station, Harvard, Mass.; and "Radio Communication in Strip Mines," Lewis Barco, assistant superintendent, United Electric Coal Co., DuQuoin, Ill. J. Robert Bazley, president, J. Robert Bazley, Inc., Pottsville, Pa., and Andrew Hyslop, Jr., chief engineer, Hanna Coal Co., St. Clairsville, O., were co-chairmen.

Power Requirements—Choice of a power distribution system is one of the first problems confronted in stripping, declared Mr. Quinn in his presentation of advantages, disadvantages and application of three main distribution methods; determination of adequate cable capacity; and allocation of power charges to proper operating accounts.

Overhead pole line distribution is least expensive when the mine can be

depleted without moving the utility company substation. If a single move of the substation or pole line is required, portable trailing cables should be investigated and these usually will be more economical. Purchasing power at the primary transmission voltage and reducing it to pit voltage in a mining-company substation is good practice in crop-line stripping where advance is rapid, in widely separated pits, and in pits where the concentrated electrical load is high. For maximum economy, the substation should be portable and distribution should be through portable cables.

Cables in a distribution system should have adequate capacity to avoid overheating and prevent excessive voltage drop, and determination of proper conductor size requires data on line voltage, peak kilowatt load, load factor and power factor, Mr. Quinn said. Maximum demand and load factor should govern the selection of cable to limit heating, and peak kilowatt and power factor are necessary to investigate cables for permissible voltage drop.

Power charges in stripping range from 10 to 16¢ per ton of coal and these total charges should be allocated to the various power-using operations, such as stripping, preparation and loading. This can be done by metering stripping and loading ma-

Blasting Vibrations—Over 20 yr of personal observation has not disclosed a single case of damage from vibrations caused by commercial blasting, Dr. Leet said in his description of vibration wave forms. Wave length is from 100 to 300 ft, and this means that buildings and other structures that are only a fraction of wave length in greatest dimension move as a unit on the passing wave, much as a floating crate would on a long ocean swell. Therefore, only negligible stresses are set up in the structure because everything moves the same way at the same time. He outlined Bureau of Mines experiments in which motion greatly in excess of that caused by commercial blasting was necessary to damage a dwelling.

Operators working pits near towns and villages must be concerned with legal limitations on blasting. Dr. Leet cited the means of legal control as limitation of amount of explosive, on one hand, and maximum allowable vibration, on the other, with the latter limitation being the intelligent approach to the problem. In some instances, a reduction in the amount of explosive results only in increased vibration. Pennsylvania's 0.030-in maximum allowable displacement works no hardship on strip-mine operators and keeps maximum vibration well

below the damaging limits, Dr. Leet declared.

Short-delay blasting promises to be effective in cutting material while keeping vibrations at a low level. Best effects in vibration reduction from short-delay firing do not appear to be realized until some minimum number of holes is fired, and the present trend of evidence seems to indicate a minimum of seven holes, Dr. Leet said.

Radio communications—Two-way radio communication increases operating efficiency, reduces delays and idle time, speeds repairs, relieves accident emergencies and greatly aids

supervision at Fidelity Mine, United Electric Coal Cos., DeQuoin, Ill. Mr. Barco stated in pointing out many advantages of their modern system of communication. Trucks can be dispatched to points where they are most needed, parts for repair jobs can be quickly secured, medical help is summoned in short order and all operating officials are as close as the nearest two-way set. This close contact results in less confusion and better utilization of all men and equipment.

The company radio system is licensed by the Federal Communications Commission and is subject to the commission's regulations.

Safety in Kentucky—"Education and cooperation will reduce the frequency of accidents," Mr. Sisk declared. With special reference to Kentucky, he reported that classes in practical mining are made available through cooperation of the state's vocational-training set-up, the various vocational schools, the U. S. Bureau of Mines and the seven district operators' association. The achievements of coal companies mining over 1,000,000 tons without a fatality are recognized with plaques presented at annual institute meetings and foremen without lost-time accidents among their crews for a year are publicly honored. In addition, the state-wide Kentucky Mining Institute, besides sponsoring an annual safety and mine-rescue contest, now is planning with the state university to organize classes in all coal districts to bridge the gap between vocational training and college-level engineering.

Even so, Mr. Sisk warned, safety consciousness is not reaching and influencing enough miners. Ways must be found to make them want to attend classes and learn more about mining. Possibly one answer is in specially written radio programs, in the preparation of which the U. S. Bureau of Mines might be helpful, he suggested.

Discussion of Mr. Sisk's paper brought out the suggestion that general courses in foremanship and human relations, now offered by the Kentucky Department of Industrial Relations, be specially adapted for coal-mining supervisors. This still

Coal Mining Safety

SAFETY PRACTICES in anthracite mining and in Kentucky and Indiana, the human equation in safety and the scope of U. S. Bureau of Mines efforts to improve safety were top subjects of a five-man panel Tuesday morning, with Dan Harrington, former chief, Health & Safety Branch, U. S. Bureau of Mines, acting as moderator. Participants were: R. J. Howell, safety engineer, Glen Alden Coal Co., Wilkes-Barre, Pa.; A. D. Sisk, chief, Department of Mines & Minerals, Lexington, Ky.; Ralph Whitman, superintendent, Ingle Coal Co., Elberfeld, Ind.; C. R. Stahl, assistant to the vice president, Eastern Gas & Fuel Associates, Mt. Hope, W. Va.; and J. J. Forbes, chief, Health & Safety Branch, U. S. Bureau of Mines, Washington, D. C.

Anthracite Safety—In spite of complex geological obstacles, the anthracite industry has made good headway in safety, Mr. Howell asserted, citing the methods of his own company to illustrate advances throughout the anthracite region. Through the cooperation of Pennsylvania State College, the U. S. Bureau of Mines and the Y.M.C.A., the industry has expanded mining classes and become safety-conscious, with the result that in the last 6 yr, 5,000 miners have been trained in first aid and 600 in the use of mine-rescue equipment. Much of this training has been conducted by individual companies.

Among advances in safety, Mr. Howell listed the following: (1) the recent establishment of a Mine Safety Division by District 1, U.M.W.A., to train mine safety committeemen; (2) an intensified four-stage program of inspections enlisting the miner himself; the company through the fireboss, the section foreman, the mine foreman and the safety engineer; state and federal inspectors; and, in many instances, the compensation-rating inspector; (3) enlargement of the tasks and responsibilities of the company's safety department; (4) organization of the Anthracite Safety Engineers with regular meetings; and

(5) re-study of the hazards of roof and rib, transportation, ventilation, explosives, dust, electricity, mine fires and water, with the aim of reducing the hazards and preventing accidents by new methods and improved equipment.

In discussion by the panel following Mr. Howell's paper, the following additional facts about anthracite safety were revealed: (1) upwards of 60% of all equipment now used is permissible; (2) only 3.7% of all explosives used in 1949 was black powder; (3) there has been no major disaster in 28 months; and (4) miners have gone along well with efforts to improve safety.

Coal and Business Activity

		1950 to This Date	1950 Over 1949, to Date
Est. anthracite prod., week ending May 13....	999,060	15,684,000	+ 6.5%
Est. bituminous prod., week ending May 13....	10,115,000	162,217,000	-18.4%

Source: U. S. Bureau of Mines.

Bituminous Coal Stocks				Consumption			
(Thousands, net tons)				(Thousands, net tons)			
Apr. 1, 1950	Days' Supply	Mar. 1, 1950	Apr. 1, 1949	March, 1950	Feb., 1950	March, 1949	
Electric power utilities....	11,167	50	11,055	22,127	6,900	6,397	7,347
Ry-product coke ovens....	4,848	21	3,449	11,452	7,144	5,714	8,513
Beehive coke ovens....					462	40	695
Cement and rolling mills....	500	21	453	1,023	745	649	849
Steel mills....	253	30	528	984	565	679	666
Other industries....	7,070	25	6,540	14,574	8,740	7,960	9,918
Railroads (Class I)....	2,755	15	2,093	8,908	5,522	4,119	5,565
Retail dealers....	1,161	4	465	1,463	10,025*	8,864*	9,784*
Total....	28,054	22	24,583	60,511	40,043	34,322	44,337

Source: U. S. Bureau of Mines.

*Retail dealer deliveries.

	Latest Week*	Month Ago	Year Ago
Business Week Index of Business Activity, wk. ending			
May 13.....	206.7	202.5	187.6
Steel Ingot operations (% of capacity).....	101.3	100.0	95.6
Electric power output (million kw-hr).....	5,964	5,863	5,267
Crude oil production (daily avg., 1,000 bbl).....	5,115	4,999	4,955
Misc. & L.C.I. carloadings (daily avg., 1,000 cars).....	74	72	72
All other carloadings (daily avg., 1,000 cars).....	50	45	56
Prices, spot commodity index (Moody's, Dec. 31, 1931 = 100).....	382.2	359.9	344.2
Prices, industrial raw materials (B.L.S., Aug., 1939 = 100).....	227.0	218.8	230.3
Prices, domestic farm products (B.L.S., Aug., 1939 = 100).....	323.7	305.5	290.2
Prices, finished steel composite (Iron Age, lb).....	2,837c	3,837c	3,705c
30 Stocks, price index (Standard & Poor's Corp.).....	145.3	142.7	118.4

*Date of latest week for each series on request.

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would not reach the mine worker, Mr. Sisk answered. Turning to mine inspections, he explained the task of keeping tabs on the establishment and location of many small mines that spring to life overnight and the difficulty of getting safety training to workers in those mines. The answer to this problem may be a state mine-licensing law, he said.

Safety in an Indiana Mine—"The success of a safety program depends on the employee, as well as the management, and we have striven... to educate the men and maintain their cooperation on safety," said Mr. Whitman, who discussed safety work at his company's Ditney Hill mine. With special stress on difficult roof conditions and measures to make the mine safe, he told how timbering is done in 25-ft-wide rooms to leave 12-ft clearances for shuttle-car roadways on the left side; how safety posts are set to within 8 ft of the face; how 14-ft main haulageways are timbered with 60- to 90-lb rail sections; how steel pins and stringers are used to support crossbars on mains; and how I and H beams are used at entry turnouts.

In addition, safety at the Ditney Hill mine is enhanced by the following practices: proper track building and maintenance with strategically placed electric switches, main track being cleaned and sprinkled at least once a week; a systematic haulage plan with two dispatchers, signal lights, radiophones and telephones; exhaust fans for ventilation plus an emergency escapeway for men; steel lining for air shafts and slopes with permanent concrete stoppings and overcasts; bugdusters and calcium chloride for dust control; and rock-dusting always to within 80 ft of the face. With these precautions and others, the Ditney Hill mine has averaged only 0.79 fatalities per million tons for the past 10 yr, against the national average of 1.24 for 1949, which was a record for the bituminous industry as a whole.

Discussion of Mr. Whitman's paper brought out that the use of bugdusters cuts dust about 70% and that calcium chloride cuts it still further. Since the mine is gaseous, abandoned sections are sealed permanently and seals are inspected each shift. Breaking with Airdox, as is done at Ditney Hill, increases the direct cost of breaking slightly but it leaves roof in good condition, minimizes danger of fire and explosion and makes on-shift breaking possible.

Human Equation in Safety—The unqualified backing of top management, a plant kept in the safest practicable condition, safe working practices backed by logical rules, and employee cooperation are the four foundation blocks of industrial safety, Mr. Stahl declared. Of these, the last two are most important because they make up the human factor. Assuming that foremen, who are indispensable



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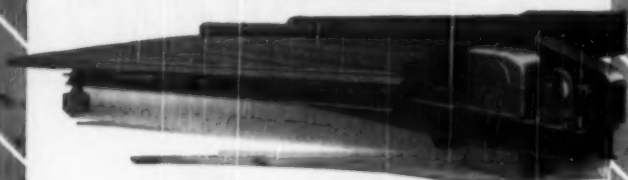
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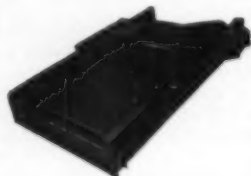
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COAL MEN ON THE JOB



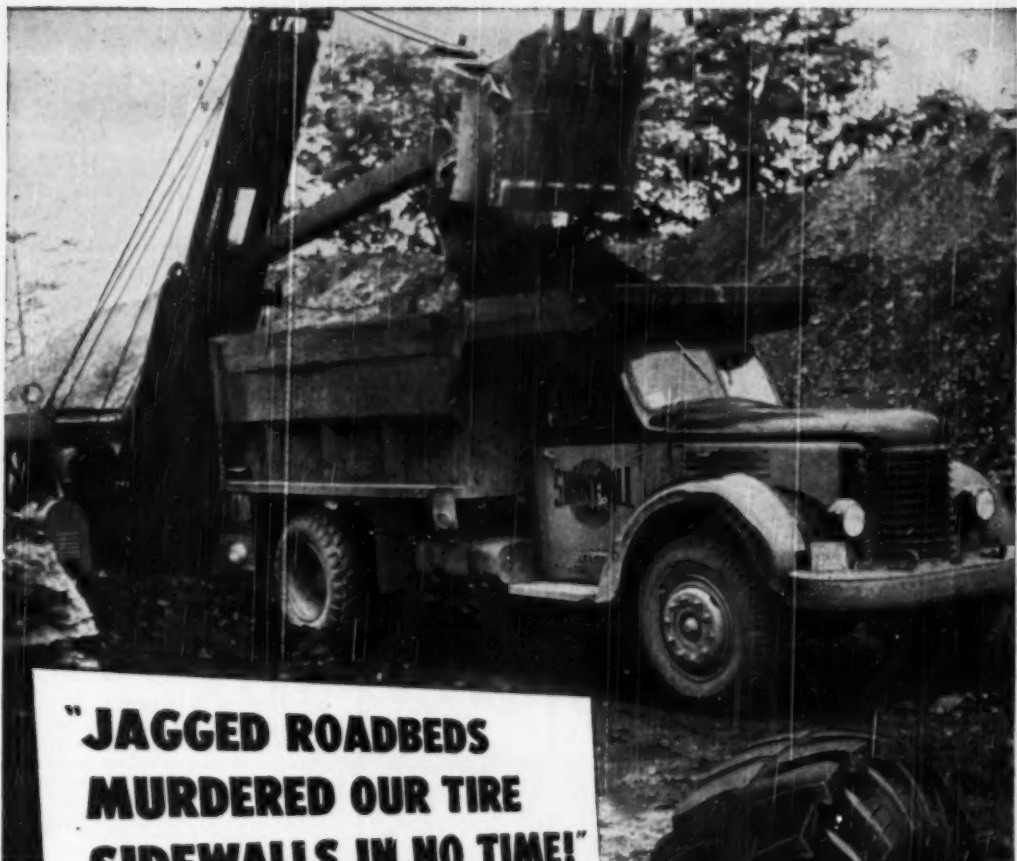
H. E. FITCH (left), superintendent; and Harvey Eskins, garage foreman, Blackfoot Coal & Land Co., Oakland City, Ind.

agents in a safety program, have been properly sold on safety, how can they and the company gain the confidence and cooperation of the men, he asks.

Foremen should be trained in leadership and human relations, Mr. Stahl argued. They should learn that each individual is different from his fellows and must be handled in terms of his own complex personality in such ways as will satisfy his human needs. The spirit generated by these methods penetrates the entire group and produces group cooperation, which reveals itself when, for example, every employee of a company—officials and workers alike—signs up for a Bureau-taught course in safety. Giving a few hints for better man-to-man relations, Mr. Stahl urged supervisors to call men by their names or nicknames and to show no favoritism in reward or punishment.

How the Bureau of Mines Helps—
"The last major coal-mine disaster occurred on Nov. 4, 1948; . . . the last major explosion disaster (up to the time of preparation of this manuscript) occurred in July, 1948," Mr. Forbes reported in reviewing the growth of the safety work of the U. S. Bureau of Mines and its cooperation with state agencies and mining companies. Safety progress is further shown in the record for 1949—a loss of only 593 lives, 375 fewer than the former low record in 1946 and 417 fewer than in 1948.

Bureau accident-prevention courses, now available through an enlarged teaching staff to supervisors, those who aspire to be supervisors, mine-safety committeemen and other mine workers, have played a strong role in reducing the accident rate. Teaching methods employ the most modern aids—films, photographs and charts.



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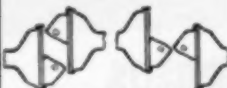
Exclusive nose-and-pocket heads have amazing gathering range, yet couplers are self-centering, self-leveling . . . won't "jack-knife" under compression. Pull is transmitted entirely through rugged cast-steel contacts. Buffing pressure and pushing forces are taken by husky flanges—not by the locking parts.

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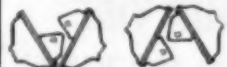
Heads are always ready to couple . . . won't lock, and can't be lock-set unless two heads are tight together. Long-time railroad coupler specialists designed this better coupler for safer, faster mine car use at big savings in over-all costs.

• Made in swiveling and non-swiveling types, and with attachments—as required—for locomotives.

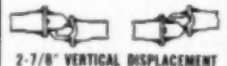
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In 1949, 4,411 supervisors and 752 ambitious workers completed the accident-prevention course, bringing the total of those who have gone through training up to 15,208.

Supplementing the accident-prevention course for supervisors is a safety course for mine-safety committeemen and miners, Mr. Forbes pointed out. Certificates are presented to each mine and each local union whose members enroll and complete the course 100%. Teaching aids are identical to those in the 40-hr course for supervisors but the miners' course takes only 20 hr. Over 9,700 men completed the course in 1949.

In addition to training courses, Mr. Forbes summarized other Bureau activities aimed at greater safety, including the following: testing and certification of machines and equipment as permissible; recent establishment of a special section of the Bureau on roof safety; basic research in roof action and control; mine inspections and accident investigation; and accident analysis and safety competition. "The highest attainment in accident prevention will be brought about through the united efforts of workmen, mine officials, and state, federal and other agencies interested in coal-mine safety," he concluded.

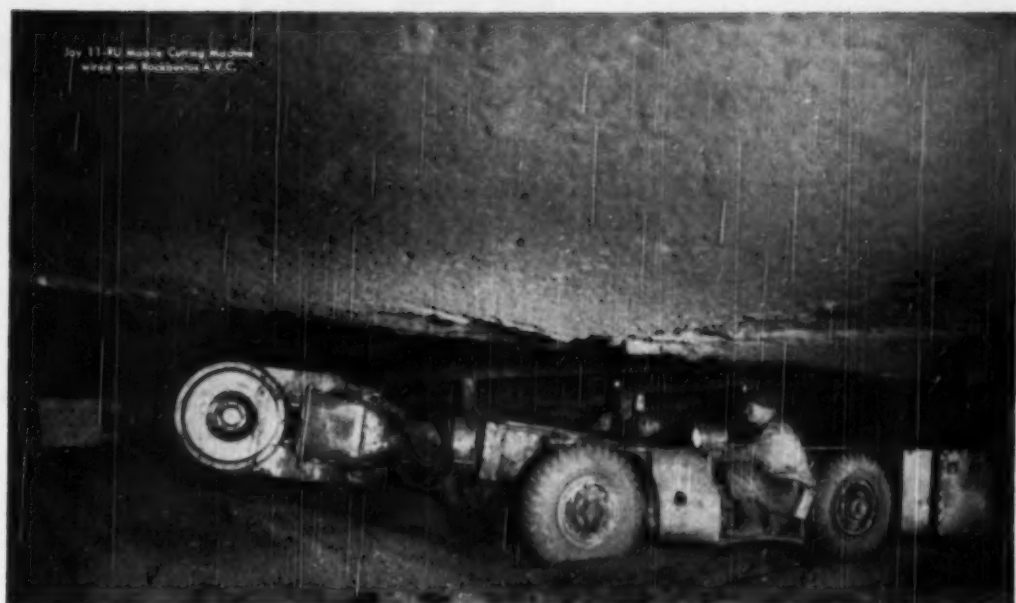
Coal Drying

METHODS FOR DRYING coal mechanically and thermally and for recovering fine coal and sludge held the attention of men attending the preparation session Tuesday morning. James Hyslop, president, Hanna Coal Co., St. Clairsville, Ohio, presided over the seven-paper session.

Mechanical and Heat Drying—Mechanical and thermal drying of fine coal in a new large-capacity plant that went into steady operation in January, 1949 (*Coal Age*, October, 1949), was described by F. P. Calhoun, assistant production manager, Rochester & Pittsburgh Coal Co., Indiana, Pa. The addition of three Robins 4x16-ft dewaterizers handling the table-washed product ahead of vertical-type centrifugal dryers has largely overcome some consumer objections to the physical nature of the slack products at first encountered. On these dewaterizers, the first 8 ft is 1/4-in Bixby-Zimmer screen and the second 8 ft is 1/4-mm of the same make. The product, containing 7 1/2% surface moisture, goes to the thermal dryers. The through product is moved from a settling tank to the centrifugals.

Filter cake with 22% moisture from a Dorr thickener is conveyed either to thermal dryers or past them to the dried-coal conveyor. Coal 1x1/4-in dried in a McNally-Vissac unit comes out at 120 F with 2% surface moisture when the average temperature under the screen deck is 150 F. Coal in the surge bin ahead of the dryer carries 9.4% surface moisture when

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the filter cake is bypassed and 10.2 when it is included. A desired surface moisture of 3% from the Raymond flash dryers is maintained by keeping the exit gas temperature at a predetermined value. The drying system evaporates approximately 65 gpm. Therefore, the plant cannot operate in a totally closed water circuit at all times.

Answering a question, Mr. Calhoun said the dust loss from the flash dryer is approximately 0.5% of the feed. Experiments with bag collectors are now underway and it is thought that 85% of the 5-micron dust escaping from the cyclones can be recovered. Value of the recovered dust will not pay for the cost—it is a matter of reducing air pollution.

Centrifugal Drying—"Highly satisfactory" experience with CMI centrifugal dryers was reported by F. R. Buckley, preparation engineer, and George Land, director of research, West Kentucky Coal Co., in a paper read by Mr. Land. The company has had over 3 yr experience with two of these dryers at the East Diamond plant. A recent 21-day operating test of the dryers showed surface moisture and ash percentages in the feed and product, for two sizes of coal, as follows: $\frac{1}{4}$ -in-x10-mm—moisture, 18.56-5.15; ash, 7.08-6.71; 10x28-mm—moisture, 28.97-7.92; ash, 7.93-6.47.

For 1949, the third year of operation—227,945 tons dried—the total operating costs (fixed charges excluded) of the dryers was 9.4c per ton. That cost was as follows: repairs and supplies, 5.21c; power, at $1\frac{1}{2}$ c per kw hr, 2.62c; labor, 1.57c. Items making up the repairs and supplies were: screen plates, 1-mm (29-mesh) dryer, 1.51c; screen plates, 1/16-in (10-mesh) dryer, 0.76c; repairing cones, rotors and flights, 1.02c; launders, liners, shields, etc., 0.94c.

Proper preventive maintenance is the secret of successful performance. Average life of the 1-mm screen is 24 hr operation; 1/16-in (10-mesh), 48 hr. Spare baskets with screen renewals on them are kept handy and, although usually changed on the third or off shift, can be changed on shift in about $\frac{1}{2}$ hr if necessary.

In discussion, Russell Wilmot, superintendent, Piney Fork (Ohio) plant, Hanna Coal Co., said that effluent from the Piney Fork vertical centrifugal dryers contains 28% solids and that 18% of the $\frac{1}{4}$ x0 feed is returned to the drying system.

Flash Drying—A Raymond flash dryer in a plant placed in operation in August, 1948, at Mine No. 24 of the Island Creek Coal Co. has exceeded promised performance and capacity, said F. C. Menk, director of engineering. Success was not had, however, until several changes were made, including the addition of a surge bin and redesign of ducts to reduce air resistance so that velocity in the upstack



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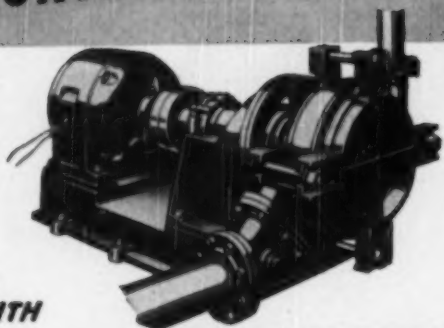
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Gland is under suction pressure only. Hence, it's less vulnerable to abrasive solids... less subject to packing troubles.
Four adjusting screws close the worn clearances on the suction side of impeller. This adjustment moves the entire rotating assembly as a unit.
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Centrifugal Pumps

was increased from 3,000 to 5,400 fpm and the inlet temperature lowered from about 1,400 to 900 F.

A Bird filter permits recovery of practically all the fines. Its filter cake, amounting to about 49 tph, carries 16.65% surface moisture. Last July, after handling 100,000 tons of coal, the spiral was replaced and the one removed was found in a better-than-expected condition. In December, 1949, after developing a noise, the gear head of the filter was exchanged for reconditioning.

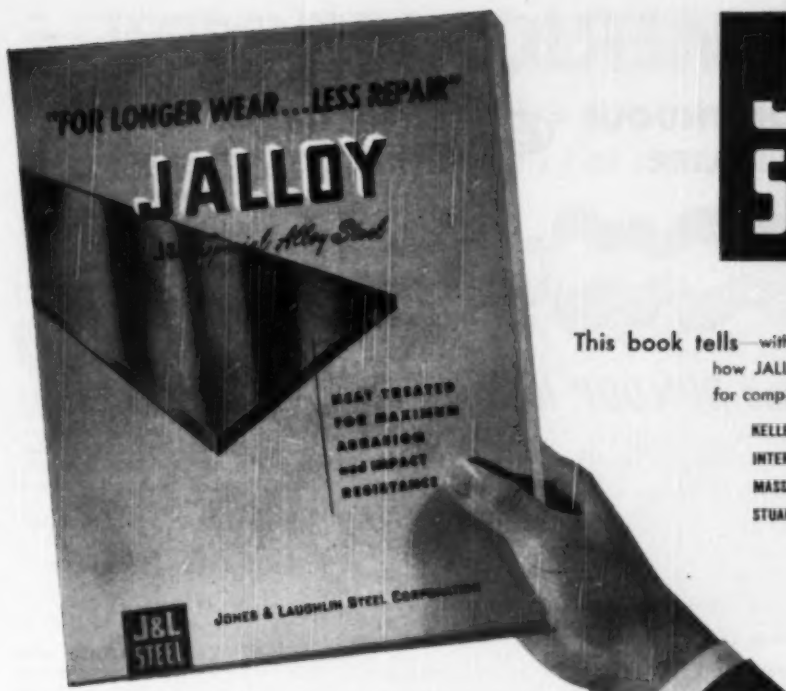
Anthracite Progress—"The laboratory approach to dewatering and drying methods as applicable to fine anthracite coal can be correlated to the design and operation of plant equipment." This was the conclusion of a lengthy paper read in part by Wm. T. Turrall, preparation engineer, Lehigh Navigation Coal Co., Inc., Lansford, Pa. Furthermore in "utilizing the facilities available in universities, equipment manufacturer's laboratories, together with final testing in an operating plant, there is reason to believe that more efficient methods relating to the problem will be developed."

Mr. Turrall said that his paper is not the work of one individual but a contribution of all interested parties in the anthracite industry and was prepared through cooperation of the Anthracite Advisory Committee, their companies and Pennsylvania State College. The treatise went into the fundamentals of all methods of anthracite drying and laboratory tests, and correlates them with operational data from several methods of drying employed in anthracite plants.

Cyclone Operation—Operation of a pilot plant consisting of one 14-in cyclone and a loaned Peterson filter at the Ceredo (W. Va.) central plant of the Truax-Traer Coal Co., and which has led to the ordering of six 14-in cyclones for installation at this plant, was described by R. L. Sutherland, combustion engineer.

Mr. Sutherland's summary of the results was as follows: "(1) Fine coal has been recovered and deslimed in a cyclone; (2) the deslimed coal is an acceptable feed for vacuum filtering for the production of filter cake of relatively low moisture at high capacity; (3) the cyclone cleans only by the removal of high-ash slimes; (4) by combining hydraulic classification effected in the launder-feed tanks with recovery and desliming in a cyclone, a clean product has been recovered directly from the raw coal cones; and (5) fine coal having a top size equivalent to that of the solids in the effluent from the screen-type centrifuges has been recovered. The proportion of the total fine material that can be recovered ahead of the launders and centrifuges has not been determined."

The battery of six 14-in cones "will act initially as deslimers and to determine the extent to which clean fine coal can be recovered from launder



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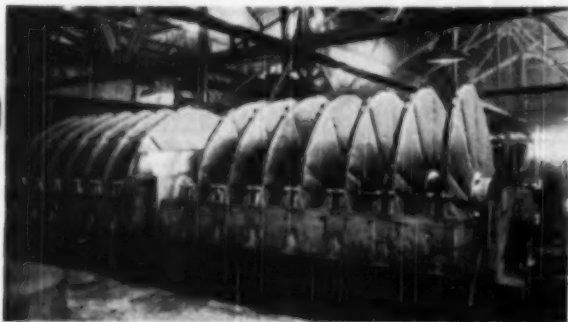


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feed and washed-coal tanks." Mr. Sutherland rounded out his discussion with a number of tables of test data on recovering and desliming fine coal with cyclones. A description of the entire Ceredo plant will appear in an early issue of *Coal Age*.

Heat Drying — Approximately 30¢ per ton, including depreciation and maintenance, is the cost of drying the output from a Multi-Louvre drying plant at Mine No. 47 (Harco, Ill.) of the Peabody Coal Co., said J. L. Erisman, manager, Dryer Division, Link-Belt Co., in a paper on "Sludge Recovery by Heat Drying." The cost does not include digging, transportation or loading into the cars. The slurry pile being recovered is 40 to 60 ft high and covers about 35 acres.

A test run of the dryer operating at 35 tph showed the following: feed moisture, 20%; discharge moisture, 8.67 to 8.97%; temperatures—inlet, 500 to 600 F; exhaust, 185 to 200; feed, 45 F; discharge, 125; loaded into cars, 75 to 95. This plant will be described in an early issue of *Coal Age*.

Deep-Mine Haulage and Power

UNDERGROUND HAULAGE with belts and track, power controls and ac power were the subjects at the Tuesday afternoon deep-mining session, Davis Read, chief engineer, West Kentucky Coal Co., Madisonville, Ky., presiding.

Ac Underground—Using graphs to illustrate power and voltage losses for various conductor sizes, distances, loads and power factors, J. O. Cree, electrical engineer, West Virginia Engineering Co., Charleston, W. Va., discussed the use of ac power underground.

Perhaps the first ac underground was at McAlester, Okla., about 1905, said Mr. Cree. Valier mine, in Illinois, using ac at the face, held for a time the world's record for highest daily tonnage hoisted, and No. 4 mine of the Spruce River Coal Co., Ramage, W. Va., using ac mining machines and battery-locomotive gathering, had the lowest power cost in the Kanawha field (*Coal Age*, November, 1949).

Mr. Cree showed the advantages of a combination of 440-v distribution to load-center transformers where capacitors are installed, and 220 v from there to the room face. He contended that ac power is indicated for units such as the new continuous mining machines requiring 150 to 175 kw. For such a unit, 220 v with 4/0 conductors requires transformers within 500 ft of the machine and capacitors within 50 ft, while with 440 v and 500,000-cir mil conductors, transformers and capacitors can be 3,000 ft away from the unit, which, for convenience, would be served by a 100-ft length of 4/0 cable.

Ac and Dc Compared—David Stoet-

INSIDE, OUTSIDE, UP OR DOWN...

conveyor belts by U. S. Rubber deliver greater tonnage over longer hauls, and higher lifts, on every kind of coal haulage job



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When you plan a new conveyor system, big or small, or when your belts need replacing, get in touch with United States Rubber engineers. They will help you solve your belt problem. Write to

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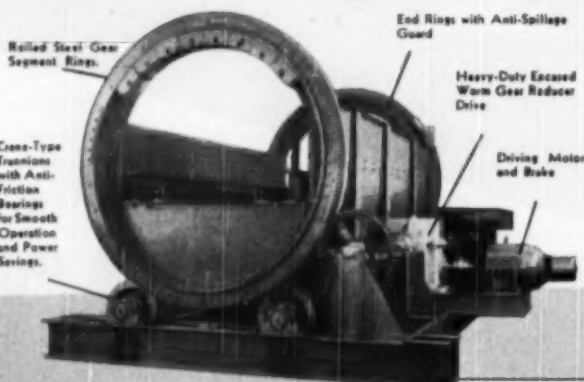
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COAL MEN ON THE JOB



HENRY O. ERB (left), preparation consultant, Terre Haute, Ind.; and I. J. Mallory, preparation engineer, Wasson Coal Corp., Boonville, Ind.

zei Jr., Mining Division, General Electric Co., in comparing ac and dc for mining service, gave the decision to ac on the scores of efficiency and mobility of the conversion equipment, safety for personnel and economy in transmission. In discussing utilization equipment for the two systems, he pointed out that a trend toward increasing use of constant-speed motors with hydraulic transmission is favorable to the application of ac squirrel-cage-type motors. In conclusion, he stated that, "In the case of a new mine, or a new section of an old mine, designed for conveyor haulage and continuous-mining machines, it would seem that the complete ac power layout has excellent possibilities."

In a discussion of the Cree and Stoetzel papers, R. C. Huffman, manager of power sales, Monongahela Power Co., indicated high favor for ac underground if properly engineered. Of the 14 ac mines on the Monongahela power system four are operated on 440 v and ten on 220 v. Two of the 440-v mines have grounded neutrals and trip protection and two are without.

While rectifiers cost about \$100 per kilowatt, transformer cost is only about one-quarter. At 70% power factor, the economical transmission distance is only half as far as with 100% power factor. And while ac is harder to handle and its voltage must be properly maintained, dc can be permitted to drop in voltage. However, that slows equipment and reduces production.

Belt-Conveyor Control—Rather than electrical (in-controller) interlocks for sequence control of belt conveyors, George T. Atkins, electrical engineer, Barnes & Tucker Co., Barnesboro,

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LIMA Type 2400 Dragline, with 120 foot boom stripping coal in Eastern Pennsylvania.



LIMA Type 1201 Shovel, with 42 foot boom, 32 foot dipper handle and $2\frac{1}{2}$ yard dipper digging coal and raising it a height of approximately 50 feet.



LIMA Type 1201 Shovel, with $32\frac{1}{2}$ foot boom, 22 foot dipper handle and $3\frac{1}{2}$ yard dipper loading coal at a mine near Hazleton, Pa.

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Breakdowns in mining operations are costly—not only because of difficult on-the-job maintenance, but also because of down time of expensive equipment and labor. That's why LIMA shovels, cranes and draglines, with extra "built-in" stamina for the rugged job of coal stripping and open cut mining, pay big dividends by assuring continuous operation with maximum output at lowest cost.

Sturdy unit-type construction, simple, rugged design, low center of gravity, long wide crawlers, permanent shaft alignment, smooth running anti-friction bearings, ample power for big output, big cable drums, air-operated clutches, large braking areas, and maximum use of properly selected heat-treated alloy steels—these are only a few features which help you *strip more, dig more and load more* with a LIMA.

The LIMA line includes Shovels $\frac{1}{4}$ to 6 yards, Cranes to 110 tons and Draglines variable. Rubber-Mounted units are available for $\frac{1}{4}$ and 1 yard Shovels, and Cranes to 35 tons. Lima Sales and Service offices in principal cities of the world.

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RAILS and ACCESSORIES
TRACK WORK
STEEL TIES

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Huntington, West Virginia

Pa., in discussing power controls for belt conveyors, favored either a centrifugal switch with contacts normally open or a mechanically driven low-voltage generator because they provide protection against mechanical failures. When their first belt was installed in 1930, a drum control was all that was necessary. Since then, they have been required to add the following sequence: sequence control, belt-slippage protection, emergency control, manual or automatic control, preferential feeding or coal-spillage protection, belt-speed control and room-conveyor control at the face.

Various control systems described by Mr. Atkins included the following: a low-voltage system with two bare wires strung along over the belt for stopping it from any point; the plastic cord with steel center which can provide roof fall protection and gives two-way control—for instance, one pull to stop and two pulls to start; and a new method of bare-wire control using less than 3 v. One contact between the wires, stops the belt, the next one starts it, and so on.

Sequence Control—Limiting his paper to interlocked sequence control, W. F. Roberts, electrical engineer, Jeffrey Mfg. Co., said that the use of rotary switches on each outby conveyor is gaining favor for sequence control and protection because it requires no stringing of control wires and can meet approval of the U. S. Bureau. He showed slides of wiring diagrams for the various systems and variations. (*Coal Age*, February, 1950).

Progress in mechanical mining, said Paul M. Barlow, electrical engineer, C. R. Locke Co., Charleston, W. Va., discussing the two papers on belt controls, brings further complications to control problems. Therefore, from the safety and other standpoints it becomes still more desirable to make the controls as simple as possible. The control cord and explosion-tested cord switches was the first method to meet the permissibility requirements of the U. S. Bureau of Mines.

Belt Haulage—C. W. Thompson, assistant manager, Weirton Coal Co., in a paper on "Modern Mine Haulage with Belts," submitted figures of 4.74c per ton and 2.3c per ton-mile as the projected cost for carrying coal on an underground belt conveyor 10,900-ft long between centers, installed at the new Weirton mine 8 mi south of Morgantown, W. Va.

The belt is a Goodyear Compass 150 unit, 30 in wide with 5/32-in top cover and 1/16-in pulley cover. Speed will be 300 to 400 rpm; initial capacity, 235 tph; eventual capacity, 350 tph. The drive is a 200-hp motor connected through a double-reduction herringbone gear. For control, a nylon-glass cord with cord switches every 500 ft is suspended over the entire length of the conveyor. A pull on the cord or a slate fall at any

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In re: CONTINUOUS COAL MINING AND LOADING MACHINES

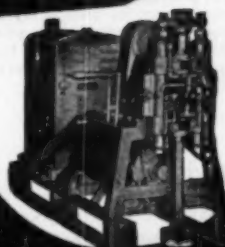
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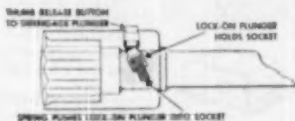
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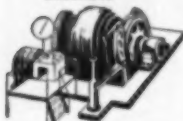
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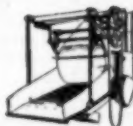
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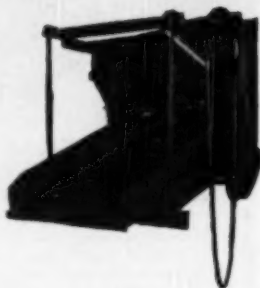


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point will lock out the conveyor until the cord has been reactivated near the point from which the stop signal originated.

The operating cost figures are based on 4,200 tons per day, 238 days and 996,600 tons per year. A total annual cost of \$47,420 is made up of \$30,850 amortization and \$16,570 operating expenses. Comprising the latter are the labor of one man greasing and inspecting, \$3,100; supplies, such as repairs, grease and bearings, \$3,000; power, at 2c per kw-hr, \$10,470.

Mr. Thompson estimates that the total savings to be realized by selection of this belt-haulage system will be over \$1,000,000 during the life of the system. He summed up the advantages as no loss of life, no runaways, no explosions, cheapest per-ton-mile cost and continuous haulage night and day the year around.

Track Haulage—Block signals, with provision against simultaneous signals, automatic track switching, automatic switches for runaways and trolleyphone communication for motormen are among the safeguards described by George F. Leatherman, superintendent of the Power & Mechanical Department, Inland Steel Co., Wheelwright, Ky. These safeguards protect a new 4½-mi single-track high-speed underground haulage system to carry coal to the new preparation plant which will soon go into operation at Price, Ky. The track is 80-lb steel on 5x7-in by 6-ft creosoted ties. The road includes four 1,500-ft passing tracks. Five 15-ton locomotives operating at 12 mph will operate over the line.

Block signals, track switches and runaway switches are actuated by pendulum and direction trolley switches. Trolleyphones on locomotives provides for such emergencies as lamp burnouts of the signal system. Recognizing that even the trolleyphones cannot be completely free from trouble, permanent mine phones are installed at each passing track, each face entry and in the working sections.

Time Studies And Maintenance

TIME-STUDY RESULTS and procedures, and maintenance organization and practice, were subjects of the deep-mining session Tuesday afternoon. J. K. Berry, production engineer, Consolidation Coal Co., Jenkins, Ky.; P. R. Paulick, consulting mining engineer, Library, Pa.; and A. W. Asman, chief, Division of Mining, Pennsylvania State College, State College, Pa., presented time-study papers. G. L. Judy, assistant superintendent of maintenance, Consolidation Coal Co. (W. Va.), Monongah, W. Va., spoke on maintenance as a direct concern of management. L. Saylor, machine boss, Chicago, Wilmington & Franklin Coal

A \$13,500,000 INVESTMENT IN THE FUTURE!



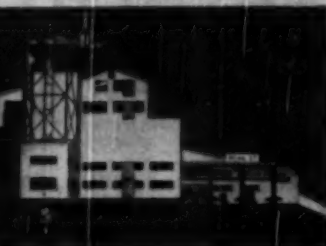
Unit No. 25
Completed January 1955
Capacity 1,500 tons annual, prepared all standard size

In conformity with the future that we have invested this unit is a real improvement and expansion program, a part of which is represented by the five modern preparation plants shown here.

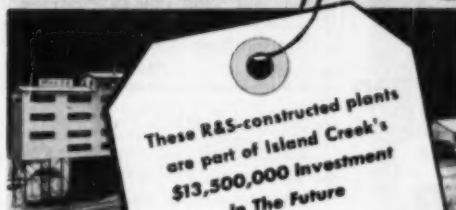
Island Creek



Unit No. 26
Completed November 1955
Capacity 1,500 tons annual, prepared all standard size



Unit No. 27
Completed March 1956
Capacity 1,500 tons annual, prepared all standard and other size



Unit No. 28
Completed May 1955
Capacity 1,500 tons annual, prepared all standard size



Unit No. 29
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These R&S-constructed plants
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Naturally, we were proud that Island Creek Coal Company chose us to construct the four new preparation plants shown above as part of its \$13,500,000 expansion and improvement program.

These Island Creek contracts were about as big as any ever signed in the industry before, but the total size of the projects did

not scare us one bit . . . because we are big enough to engineer and construct preparation plants of any conceivable size and capacity.

But, big plants are not our exclusive business. We don't always deal in terms of millions, so don't let that price tag scare you away. As always, we are flexible enough to build preparation plants of any size or description—large or small, the whole job or any part of it—in any place in the U.S., or outside the U.S. And we can start work whenever you are ready.



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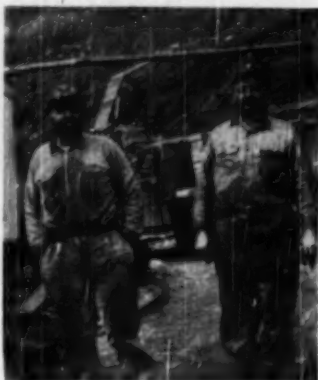


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COAL MEN ON THE JOB



F. E. HILL (left), chief electrician; and E. S. Smallwood, superintendent, Burton mine, Richwood Sowell Coal Co., Richwood, W. Va.

Co., West Franklin, Ill., discussed Mr. Judy's paper. R. L. Adams, vice president, Old Ben Coal Corp., West Frankfort, Ill., was chairman.

Time Studies on Face Preparation—The first function of a time study is diagnosis, Mr. Berry said, in pointing out that a study of the mine operation causing a bottleneck should be analyzed to find the cause or causes of low performance. The cause of poor performance usually will be one or more of the following: excessive delays, improper method, incompetent labor, poor division of labor, inadequate equipment, insufficient labor, or, the operation requires a fixed time and can be done no faster. Mr. Berry offered specific examples of operating-efficiency increases resulting from finding these troubles through time studies and then correcting the condition. Time studies are a tool and not a cure for anything, declared Mr. Berry, in stressing the importance of decisive action based on good studies.

Time Studies on Loading—Loss of some coal markets can be neutralized by intelligent application of highly developed management tools, stated Mr. Paulick. Time studies and job analysis are prime tools of management in many manufacturing industries and they can be applied to coal mining problems with marked success. Mr. Paulick illustrated this by citing three mines operating under similar conditions and using similar equipment. Mine A produced 45 tons per man-day, Mine B produced 32 tons per man-day and Mine C produced only 20 tons per man-day. Mine A made continued effective use of time studies to cut delays and plan operations for maximum efficiency.

Good time studies require specialized skill in assembling and analyzing data, and in planning corrective measures.

ures and applying them. Mr. Paulick declared that potential economies are so great that mine managers cannot afford to neglect the use of such tools as time studies and job analyses.

Time Studies on Service Haulage—Detection and correction of operating deficiencies through service haulage time studies is one to get the most from equipment investment, Professor Asman said in stressing that time studies should be made with the thought of doing the best with existing equipment. In track haulage, time studies have isolated a number of critical factors which result in failure to keep an empty car under the loading boom. They are: mechanical breakdown of the locomotive, equipment derailment, conflict with other equipment, shortage of cars and operating deficiencies. Time studies will indicate the proportion of shift time consumed in these delays and will point to a solution.

With their advantages, shuttle cars introduce a number of variables that hinder loading, and these have been identified by time studies as follows: mechanical breakdown of the shuttle car, delays at the discharge station, faulty section layout and operating deficiencies. Such hindrances to full production can be eliminated after they have been found by good studies. Similar factors affect conveyor haulage.

The majority of studies made on service haulage which resulted in improved operation gave basic data for inexpensive modification. Usually, the costliest item is that of taking the study and analyzing it, Professor Asman concluded.

Mining Maintenance—Management must look at greater losses resulting from poorly organized maintenance, Mr. Judy held while emphasizing the changes that mechanical mining has brought to maintenance practice and personnel. He suggested mine maintenance organization that places the maintenance head in a staff position, gives him a competent administrative staff and trained mechanics and elec-

tricians, and furnishes an adequate stockroom of parts and tools. Formal records are a definite aid in keeping preventive maintenance on a schedule basis, and production records of each machine will be useful in determining need for overhauling or rebuilding.

Substations and other electrical equipment require special care because of their high initial cost and their direct influence on the operation. Considerable expense is involved in setting up a good maintenance program, Mr. Judy declared, but the dividends inherent in good maintenance justify such expense.

Mr. Saylor agreed that formal reports are important in maintenance, and such reports from maintenance

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men and production supervisors can be used as a guide for future action by the maintenance supervisor. Mr. Saylor also recommended the unit-replacement system of maintenance for heavy machinery as being a most efficient way to limit down-time.

Power, Machines and Methods in Stripping

EXTRA-HIGH VOLTAGES for big stripping machines, a wheel excavator for removing overburden, and the planning and use of outside curves in overburden disposal were subjects at the strip-mining session Tuesday afternoon, L. Russell Kelce, president, Sinclair Coal Co., Kansas City, Mo., presiding. Speakers were: J. E. Borland, Mining Division, Westinghouse Electric Corp., East Pittsburgh, Pa.; J. J. Huey, chief electrical engineer, United Electric Coal Cos., Chicago; and R. M. Dickey, sales engineer, Bucyrus-Erie Co., South Milwaukee, Wis. Mr. Dickey's paper was prepared jointly with L. E. Stewart, engineer, Maumee Collieries Corp., Terre Haute, Ind.

More Than 4,000 Volts—With variations and high-peak power demands characteristic of large shovels and draglines placed in service in recent years, it has become harder to limit the variation in ac voltage received at the machines, Mr. Borland stated. Under these conditions, requiring that mine substations usually be kept within a mile of the load, many mines have adopted portable substation units. Would operation of big machines at voltages higher than 4,000 add to efficiency? This was the question Mr. Borland raised.

A good general rule for obtaining best performance from a synchronous motor with a minimum of lagging or leading power factor is to provide that the ac voltage at the motor terminal vary no more than from a minimum of 90% of rated voltage at peak loading to a maximum of 110% at light or regenerative loading, Mr. Borland explained.

Evaluating the possible benefits of voltages higher than 4,000, he cited theoretical data on maximum distribution distances and energy losses in the distribution systems of large machines with 4,000, 6,900 and 13,800 v. From these data, he concluded that with 4,000-v power supplied over a pole line and 1,000 ft of trailing cable to a machine having peak power demand of some 2,800 kw, maximum distribution distance will be about 1 1/2 mi; with 6,900 v, maximum distance will be about 50% greater; with 13,800 v, maximum distance will be about 4 1/2 mi. At the longer distances permissible with higher voltages, no savings in energy losses are indicated but at distances less than maximum there may be appreciable savings.

Mr. Borland summarized possible effects of higher voltages on the cost

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The Greensburg "Monitor" Type is the first real improvement in storage battery locomotives. ENTIRELY NEW IN DESIGN. Its efficiency and economy have been proved in actual mine use. Operators report 20 to 25% more coal hauled than with other battery locomotive having the same battery capacity. From 6 to 10 ton capacities: track gauges 36" to 56 1/2". Other locomotives from 1 1/2 tons to 10 tons, 16" to 56 1/2" track gauge.

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and design of the distribution equipment, including transformers and switchgear, pole lines, cables, collectors and ac motors.

Wheel Excavator — At the Cuba mine, United Electrical Coal Cos., Cuba, Ill., about 40% of an 80-ft overburden is removed by a wheel excavator, Mr. Huey said. The overburden is fairly free of rock. The wheel, equipped with cast-steel buckets, makes a bench along the highwall and discharges dirt out the side onto a short conveyor belt known as the ladder belt. The ladder belt discharges onto a long conveyor that carries the material to the bank.

Over-all length of the machine is 318 ft, the digging ladder being 70 ft, the crowd-retract motion 32 ft, the digging reach up to 118 ft and the spoiling reach 200 ft. The wheel digs from about 25 ft above the coal to a maximum of 70 ft, undercutting the top of the highwall where its height exceeds 70 ft. The wheel operates at 7 to 8 rpm. Faults in the original wheel—dirt plugging the buckets, high late dumping and consequent conveyor troubles—have been eliminated. Shocks from boulders, which sometimes are encountered, are dampened by an air-controlled cylindrical slipping clutch.

Experiments still are being made to improve design and performance of the wheel excavator. These studies include tooth and lip design; an oil-enclosed gear set for the wheel drive; means to reduce side motion and sway and increase stability; heating to cut dirt build-up within the wheel; and protection of high-speed belts, running up to 1,250 fpm, against shocks from boulders.

In operation, the wheel works in tandem with a stripping shovel, which follows along in the pit. Move-ups are in 50-ft stages and cuts average about 20 deg off the perpendicular to the highwall. Even though the material is not discharged directly opposite the digging point, overburden is stacked much farther away than a dragline could place it. The wheel can dig in hard shale without blasting but cannot handle trees and stumps easily.

"The wheel excavator is a special tool which is probably limited to a particular type of geological area. However, when the right material can be found, it certainly has great possibilities for economical and efficient removal of overburden," Mr. Huey concluded.

Outside Curves — Are the advantages of outside curves for stacking overburden measurable? That was the question raised and answered by Mr. Dickey and Mr. Stewart. Their answer was "Yes."

For any central angle of a circle, the sides of which intersect both stripping cut and spoil area, if the stripping cut is closer to the center of the circle than the spoil area, the distance along the arc of the sector

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Outstanding for accurate and uniform construction, Hendrick Conveyor Troughs are made in standard lengths of 10 feet, and 10 feet, 2 inches, but can be furnished in any desired length up to 13 feet, 2 inches.

Hendrick Ball Frames give troughs substantial support whatever the floor conditions. Write for full information.



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of the stripping cut is less than that along the arc of the adjacent spoil area, Mr. Dickey explained. On this outside curve, more spoil room is provided than in a straight pit and still more room than on an inside curve. Putting this theory into practice and taking into account width of cut, thickness of coal, height of high-wall and spoil bank and swell percentage Maumee Collieries Co. has increased depth of overburden handled from 65 ft in a straight cut to 85 ft with a proper outside curve, he reported.

To measure the quantitative advantages of outside curves, Mr. Dickey presented the following basic formula: S (length of arc) = R (radius) $\times \theta$ (constant central angle)

Since the centers of gravity of the stripping cut and the bank are the only suitable reference points for measuring the two lengths of arc, the centers of gravity must be applied as plus or minus quantities to the two lengths of arc to provide a measurement of the difference between inside and outside curves. For example, assume horizontal distances of the centers of gravity relative to the coal rib to be 49.38 ft for the stripping cut and 93.47 ft for the spoil area. Assume likewise that the radius on the outside curve of the coal rib is 500 ft and the arc of the coal-rib curve in the given sector is 100 ft. Instead of the angular measurement for the sector, the length of arc corresponding to this sector on the outside curve at the coal rib is used, these being directly related. The lengths of arc through the two centers of gravity then are arrived at as follows:

Stripping cut:

$$\begin{array}{r} 500 - 49.38 = 450.62 \\ 450.62 \\ \times 100 = 90.12 \\ \hline 500 \end{array}$$

Spoil-bank area:

$$\begin{array}{r} 500 + 93.47 = 593.47 \\ 593.47 \\ \times 100 = 118.69 \\ \hline 500 \end{array}$$

It thus is clear that the advantage of the outside curve is:

$$\frac{118.69}{90.12} = 1.317, \text{ or } 31.7\%.$$

The same formula can be supplied to a bench cut, Mr. Dickey added, with the same advantage of gaining spoil room on outside curves. Cashing in on the advantage of outside-curve spoiling, Maumes expects to handle over 90 ft of overburden in terrain where straight cuts would limit overburden to about 65 ft. This will necessitate careful planning prior to stripping, Mr. Dickey pointed out.

Coal Preparation And Gob Fires

EUROPEAN TRENDS and latest developments in coal cleaning, as well as controlling and preventing fires in gob piles and refuse banks, were the subjects of papers read at the Wednesday morning session on coal preparation. R. H. Hughes, chief engineer, Clinchfield Coal Corp., Dante, Va., presided at the meeting.

European Practice — Describing European trends in coal cleaning, John Griffen, consulting engineer, McNally Pittsburg Mfg. Co., Pittsburg, Kan., said that in England there is a definite trend toward heavy-media processes to produce low-ash coal about 1 in in size, as now demanded by the English coal users. There are about 800 preparation plants with an annual output of over 200,000,000 tons in England, he said. For new plants, the National Coal Board seems to favor a capacity of 800 tph, this usually consisting of two 400-ton plants in one, perhaps treating coals from different seams. Reinforced-concrete construction is favored over steel because it is considered cheaper but it does not lend itself so readily to changes in plant equipment.

Mr. Griffen described in considerable detail the Denby Hall and Williamthorpe cleaning plants (England) employing Barvoys baths, Hoyois troughs, Tromp heavy media using spathic iron and mill scale, froth flotation and Elmore vacuum flotation. He presented tables showing ash in the various sizes of cleaned coal from the Denby Hall plant and of coals cleaned in the Tromp baths at Williamthorpe, in the latter case including percentage of sink if any in the cleaned coal and float in the refuse (both at 1.60 gravity).

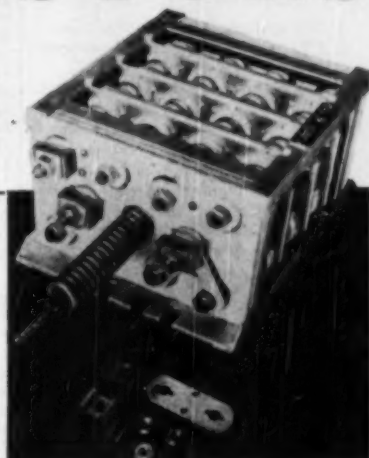
The Dutch State Mines, he reported, is now placing in operation a heavy-media bath to clean coal up to 8 in, using froth-flotation solids as a medium. The Tromp process is used in France, Germany, Holland and Poland. Cleaning of the minus 7/16-in sizes, usually amounting to 50 to 60% of the mine-run, is the main job in the cleaning of western European coals. Wet concentrating tables find little use. Instead Rheolaveurs or multiple-cell jigs, with or without a feldspar bed, are employed. Experimental cleaning with Driessen cyclones using a heavy medium is being conducted. When tests are completed,

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using froth flotation tailings as the medium, the plant will be equipped to make further tests using magnetite.

H. G. Hague, representing Fraser & Chalmers Engineering Works, Erith, England, in discussing Mr. Griffen's paper, summarized the various types of washers in 687 British cleaning plants with a total treating capacity of 55,000 tph. Classification by type is as follows: wet washers—Baum, 283; jig, 109; troughs, 46; barrels, 21; miscellaneous, 31; dry—pulsating, 37; static, 16; miscellaneous, 66; heavy-media—Barvoys, 13; Tromp, 3; Ridley-Scholls, 1; Chance, 16; froth flotation—impeller type, 36; vacuum type, 9.

P. L. Schereschewski reported that the French coal industry had spent \$150,000,000 in 1949 on coal industry improvements, mostly on preparation plants and mine power plants.

Trends in Preparation—A. C. Richardson, supervisor, Battelle Memorial Institute, Columbus, in analyzing "Latest Developments and Trends in Coal Preparation," contended that coal preparation is one of the best ways for the industry to meet the competition from other fuels. His paper summarized the situations in the cleaning of each size of coal.

For removal of coarse rock an oscillating picking table is a practical solution. For the same purpose and for producing a maximum size of coal for cleaning and an oversize refuse, the Bradford breaker is a good machine.

Coarse-coal washing is not a particularly difficult problem and the maximum top size now washed is in the neighborhood of 10 in. Baum-type and heavy-media separators now wash a large percentage of the coarse-coal tonnage. While jigs make a middlings product, heavy-media plants normally make a two-product separation in a single unit. Recently there has been developed a two-section two-density heavy-media system that looks promising. Also the Chance cone has been modified in design and operation to permit one unit to produce a low-ash coal, high-ash middlings and a refuse.

Dry cleaning of fine coal is being improved. Because some installations of 25 yr ago that dry-cleaned up to 4 in were unsatisfactory, most later installations were limited to 1/2-in dedusted coal. Improvements have brought a trend toward extending air cleaning to 1 in or larger.

Recent wet-table installations for cleaning of coal finer than 1/2-in have involved very large tonnages. The Dutch cyclone is being put to many uses, including separation of coal and refuse from a middlings product from other cleaning units; for thickening fine coal as small as 200-mesh; as a water classifier in removing particles a few microns in size; and, in a recent laboratory test, using magnetite as a medium, as a cleaner for 1/2-in anthracite and bituminous coals.



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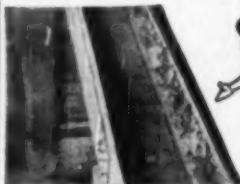
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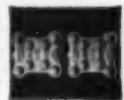


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Flotation has been established in coal preparation and at plants of the Sloss-Sheffield Steel & Iron Co., in Alabama, coal as coarse as 10-mesh is being froth-floated, using kerosene as the sole reagent.

For dewatering the sizes finer than $\frac{1}{2}$ -in., Mr. Richardson said that there appears to be no substitute for a centrifuge. "Vertical centrifuges are used when fine coal can be sacrificed for a lower moisture in the cake. Horizontal centrifuges are used when higher recovery is desired and a higher moisture is acceptable." Perhaps amounting to a trend is a move to use two centrifuges in series, the first making a low-moisture cake and the second recovering the fine coal from the effluent of the first and classifying this effluent.

In thermal drying of washed coal coarser than 4-mesh, the screen-type dryer finds preference. Use of a new shaft-type dryer will probably increase. Mr. Richardson predicted that most of the fine-coal drying will be done with heat. The cascading Multi-Louvre dryer, which was developed for fine coal, is now satisfactorily drying coal as coarse as 1 in. The flash dryer seems to have the greatest appeal for coal finer than 4-mesh. In eastern Washington a new plant dries minus $\frac{1}{2}$ -in in a unit consisting of an enclosed vibrating screen with 1-mm openings on top of a square tower. This dryer makes three products; coarse, fine and dust, which can be recovered separately or combined.

Dry-Cleaning Progress—William C. McCulloch, Roberts & Schaefer Co., Chicago, emphasizing dry cleaning in discussion, said that up to 1 $\frac{1}{2}$ -in and down to 48-mesh is now being air-cleaned successfully. The top size may be extended but probably not back up to the 4 in. Several plants with pre-drying for pneumatic cleaning are in use and this pre-drying is a definite trend. Froth flotation, which will at least take all the black out of the water, should have a place in water clarification as well as cleaning. Since the term "heavy media" now includes everything from magnetite to sand to clay, there has arisen a need for a standard terminology.

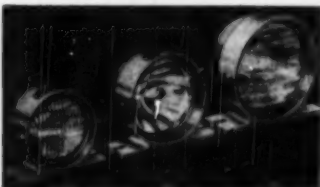
Extinguishing Gob Fires—After reviewing legislation adopted or proposed in five states for control of air pollution, Henry F. Hebley, research consultant, Pittsburgh Consolidation Coal Co., exhibited with his paper, "Problems of Controlling Gob-Pile Fires," photographs and drawings of methods proposed and tried. A building with foundations on an old gob pile and threatened by the pile catching fire was saved by pumping in grout consisting of a 50-50 mixture of limestone dust and water through perforated 2-in pipe driven into the pile.

Full-scale experimental-stage solutions for gob piling in layers on hill-sides and covering each layer with gob and earth were shown. The gob

layer thicknesses range from 3 to 6 ft, depending upon the individual operations. In some instances, the pile is started by making a box cut at the foot of the slope. Thus, the edge of the first layer is automatically buried. In other instances, the refuse is laid down first. In either method cuts are taken from the hillside to get material for covering the layer of gob and the outside edge, at the same time making more room for the next flat layer. Mr. Hebley warned that agitation may be encountered for rules requiring a layer of clay 3 ft thick over each 4- to 5-ft layer of gob.

Anthracite Experience With Gob Fires—No sure method of preventing or extinguishing refuse bank fires at anthracite mines is known, said E. T. Powell, chief engineer, Susquehanna Collieries Division, M. A. Hanna Co. His discussion of "Preventing and Extinguishing Fires in Refuse Banks" included the results of a survey of 34 anthracite refuse-bank fires 16 of which have been extinguished with the remainder still active.

His recommendations were: (1) Enforcement of no trespassing rules; which would eliminate about one-fourth of the fires reported; (2) care that no easily combustible material, such as old mine timber or ties, household rubbish, etc., is deposited on the bank; (3) systematic patrolling of the banks to discover fire in the early stage, thereby increasing the chance



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of success in extinguishing the fire and reducing the cost; and (4) excavation or isolating the fire area by trenching have proven to be the most successful methods of controlling bank fires."

A mixture of silt with breaker refuse has had a definite effect in causing firing of banks. The five fires charged to spontaneous ignition were in the northern or Scranton-Wilkes-Barre area, four of them in refuse deposited from one seam in which underground fires of spontaneous origin have occurred.

Setting Up Pension Plans

TELLING EMPLOYEES THE FACTS about pensions, principles to follow in establishing a pension plan and the actual operation of a pension program in one coal company were the subjects at the Wednesday morning session. Speakers were: R. C. Edlund, plans board chairman, Fred Rudge, Inc., New York City; J. W. Myers, manager, Insurance and Social Security Department, Standard Oil Co. (N. J.), New York City; and C. N. Crichton, secretary-treasurer, Johnstown Coal & Coke Co., Johnstown, Pa. Hugh B. Lee, vice president, Maumee Collieries Co., Terre Haute, Ind., presided.

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ers owe to employees and the public much more information than has been given them about the many important problems involved in pensions for old age," Mr. Edlund declared. He urged coal men to approach the broad pensions problem along four lines: (1) sheer size of pensions and their impact on company and national economy; (2) the unique strong and weak points in one's own company that determine what obligations it can assume; (3) the facts which management should pass along to employees; and (4) the challenge and the test that the pensions problem presents to an individual company and industry as a whole.

The increasing number of old people and their retirement means, among other things, that there is a growing group that no longer produces goods for itself but depends on others to provide for its needs. Likewise, it means that young people must give up some of the rewards of their own labor to take care of older people and must therefore defer some of their own hopes. The cost of pensions, Mr. Edlund stated, may rise to fantastic levels, in the order of \$20 billion a year.

Each company should make a careful study of its ability to sustain a pension plan before making any commitment. For companies that can afford to pay pensions, there are advantages, he pointed out, in that pensions provide a systematic way of retiring older employees, open the way for promotion of younger people, boost morale, reduce labor turnover, attract better grades of workers, increase employees' pride in the company and create public good will.

If a communications system now exists within the company, it should be exploited freely for getting the facts across and for learning what employees think, for communication is a two-way street. If a system does not exist, one should be set up. Mr. Edlund urged. The place to start is with management and supervisors, using interviews, graphic presentations and other communications tools. The share-the-facts campaign should be sustained, possibly by earmarking as much as 1% of a pension plan's cost to sell and re-sell it to those who benefit by it.

Pensions offer a challenge and opportunity to business, Mr. Edlund said. The challenge is to educate people in advance for old age and to find work for them to do within their abilities. The opportunity is that pensions, if properly presented, can help make capitalists and cooperators of workers, point up the old virtues of thrift and economy and stimulate higher productivity.

Voluntary Pension Plans—In setting up a pension plan for supervisory employees, a coal company, like other companies, must decide upon the relative priority of the seven kinds of security most often sought by employees, Mr. Myers stated. These

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MARION BOYLES (left), field engineer; and John T. Fuller, engineer, Tecumseh Coal Corp., Boonville, Ind.

kinds of security are: short-range—(1) industrial injuries, (2) unemployment, (3) temporary disability and (4) hospitalization and medical care; long-range—(5) dependent survivorship, (6) permanent total disability and (7) old age. A stable pension plan requires restraint against over-generosity, balance among the several types of security, sound financing, vesting employees with certain rights regardless of a change in jobs, contributions by employees and consideration for the dual role of government and private welfare programs, with the government providing the basic layer of security.

Mr. Myers dwelt at some length on the basic policies necessary to private pension plans and on desirable changes in the federal program and relevant labor laws and revenue codes. Speaking of the special problems of the coal industry, he pointed to the makeshift social-security program provided in the wage contract as an obstacle to the evolution of a sound pattern but warned that abandonment of the field to the government would be a deceptively simple solution: "Unless a sound, private-enterprise system can be found and taken, the only result will be another long and important step toward complete socialization of the economy," he concluded.

Plan for Supervisory Pensions—Recognizing the weaknesses of an unfunded pension plan for supervisors and other management employees some years back, when retired persons were simply pensioned over the payroll with little thought for future costs or contingencies, Johnstown Coal & Coke Co. recently set up a funded plan, Mr. Crichton reported. The funded plan is more desirable from the employees' standpoint, it offers better protection and it has certain tax and accounting features in its favor, he explained.

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brackets. The plan is non-contribu-
tory because, with a fairly high rate
of personnel turnover in the coal in-
dustry, the employer would have to
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Of the three ways of funding—group annuities, individual insurance policies and trust-fund plans—the company chose the last to suit its special needs. Administration is in the hands of a corporate trustee. The retirement committee is made up of three company executives. Drawing on his own experience, Mr. Crichton urged that coal companies planning to set up pensions employ trained consultants, give careful study to the needs of their employees and the machinery that will serve them best, and provide adequate flexibility to meet future contingencies. He warned that whatever makes sense for Johnstown Coal & Coke Co. may not be good for some other company and urged that each company that contemplates a pension plan analyze its own needs and abilities and shape its plans accordingly.

Foreign Oil Threat—Invited by the chairman, Mr. Lee, to make a statement at the close of this session, Walter F. Shulton, assistant to the first vice president, Pittsburgh Consolidation Coal Co., Pittsburgh, Pa., pointed out that "a flood of foreign oil" is endangering the coal, railroad and domestic oil industries, causing unemployment, retarding the opening of new coal mines and oil fields, slowing the development of synthetic liquid fuels and weakening the nation's security. Pointing out that in 1949 foreign oil displaced 25,000,000 tons of coal and cost the jobs of 25,000 miners, he urged coal men to support proposed legislation to restrict oil imports, and to make their views known to Congressmen and the administration in Washington.

Continuous Mining

CONTINUOUS MINING has stirred the interest of the industry because of the promise it holds for the future, said M. H. Forester, vice president, Pittsburgh Consolidation Coal Co., Pittsburgh, Pa., who presided at the Wednesday afternoon session devoted to this subject. Speakers at the meeting were: Gerald von Stroh, director, Mining Development Committee, Bituminous Coal Research, Inc., Huntington, W. Va.; Frank Eubanks, mining engineer, Old Ben Coal Corp., West Frankfort, Ill.; W. J. Phillips, assistant to the president, Sunnyhill Coal Co., Pittsburgh, Pa.; W. E. Hess, general superintendent, Vesta-Shanopin division, Jones & Laughlin Steel Corp., California, Pa.; M. F. Cunningham, sales manager, Goodman Mfg. Co., Chicago, Ill.; R. Herby, safety department, Pennsylvania Coal & Coke Co., Creason, Pa.; R. M. Hunter, electrical engineer, Rochester & Pittsburgh Coal Co., Indiana, Pa.; and C. E. Hugus, Jr., supervisor of mining applications, Reliance Electric & Engineering Co., Cleveland, O.

Continuous Mining Progress—Mr. von Stroh outlined the progress of

continuous mining to date and described BCR's development work on a mining head that can be applied to existing loading machines to convert them to continuous mining machines. Reduced face costs may be expected from continuous mining, Mr. von Stroh said in citing several examples of marked decreases, but administration and engineering costs will rise because of the extra load placed on supervisors and engineers by continuous mining. Tolerance and patience are required while these new machines are refined in service, even though this refinement may appear to present greater difficulty than the original conception and production of the machines, Mr. von Stroh declared.

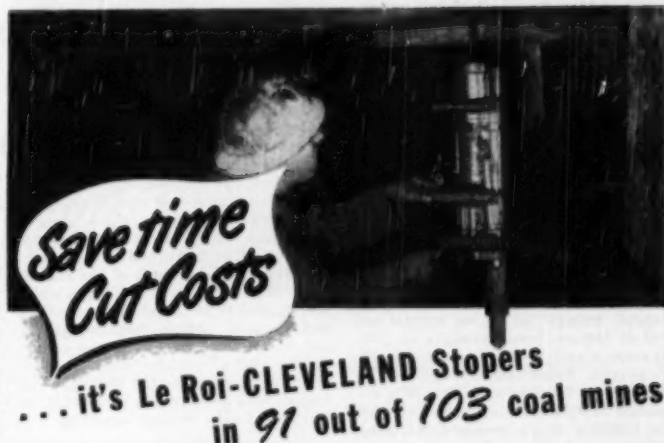
Continuous Mining Developments—Continuous mining is a reality and costs are favorable, Mr. Eubanks stated in comparing a face equipment maintenance cost of 14.13¢ per ton for a continuous machine to a cost of 14.07¢ per ton for a mechanical section using a conventional loader, universal-type cutting machine and coal drills. A new cutting head, with five chains running at a slower rate, has reduced the amount of fines produced, and a new scroll loads bottom fines directly to the conveyor rather than forcing rehandling by the cutting head. Automatic continuous lubrication is another innovation that increases the efficiency of the machine. **Colmol Experience**—Results of ex-



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COAL MEN ON THE JOB



OPERATING STAFF at Mine No. 7, Sahara Coal Co., Harrisburg, Ill., include: Walter Sadler (left), superintendent; Thomas Johns and Ernest Fulkerson, facebosses; Jess Simons, electrician; and Vern Gidcomb, mine engineer.

perience with an experimental model of the Colmo in development work in the Upper Freeport seam at Reedsville, W. Va., were reported by Mr. Phillips.

The machine is producing 425 tons per day with a five-man crew, driving 12-ft wide entries in the 46- to 51-in seam. An initial 9½-ft cut is driven 20 ft deep, then the machine backs up and takes an additional 2½ ft off one rib and advances on this line 20 ft past the original face. It backs up again to take the 2½ ft of coal left on the opposite rib. Haulage difficulties limit digging time to only 33% of available operating time, but with haulage improvements it is expected that 60 to 75% digging time can be realized.

Operating With the Continuous Miner—While the machine is still in the experimental stage, it has proven its adaptability to work under very exacting natural conditions. Mr. Heas declared in describing his company's application of the Joy continuous miner to complete recovery of a section in the Pittsburgh seam. Section layout consists of three entries on 105-ft centers, breakthroughs on 100-ft centers and 13-ft wide rooms on 25-ft centers. Drawslate is taken by the machine in the haulways, but it is expected that this material can be held on timbers in the rooms and during pillar extraction. Rooms will be driven 200 ft deep and pillars robbed immediately to prevent falls of the exposed drawslate.

Roof bolting has not been pursued to any extent because of delays to the miner, increased number of men at the face and legal restrictions on the use of bolts alone as roof support.

Some of the principal advantages of operating with the continuous miner, as pointed out by Mr. Heas, are: high production from a concentrated area; less expenditure for trackage, stoppings and doors; better

control of ventilation; better supervision in the small area of operations; and less exposed area subject to falls.

Haulage for Continuous Mining—Commenting on the transportation difficulties attending continuous mining, Mr. Cunningham pointed out that the shuttle-car and surge-car system, the auxiliary-loader and shuttle-car system, and the conveyor system all have a common weakness. They do not lend themselves to retreat or pillar mining. Experiments with short auxiliary conveyors are now in trial. Light portable belt conveyors, mounted on rubber tires, are being used in tandem between the mining machine and the inby end of a belt, chain or shaker conveyor. The main complaint so far has been awkwardness in handling and difficulty in keeping them lined up to prevent spillage.

Another system uses a "piggyback" conveyor between the mining machine and a shaker conveyor. The "piggyback" is a chain conveyor 33 ft long, with the discharge end attached to the column-type trough of the shaker line. This end of the "piggyback" travels along the trough line on rollers and a swivel arrangement keeps the end of the piggyback over the center of the shaker trough, even when it is at right angles to the shaker. The hopper end follows the discharge of the continuous mining machine.

Ventilation—Mr. Herby presented the report on ventilation for continuous mining prepared by the Coal Division's Committee on Ventilation. Seven examples of current practice in ventilating continuous mining sections were summarized as follows: all operations are in entry development work; each of the continuous mining operations is on a separate air split; six of the sections bring the fresh air up on the low-velocity side of the line brattice and return it on the high-velocity side for better visibility at the face and to reduce the danger of

methane and dust passing over the machine; from 3 to 5 water sprays are used on each job, and one mine uses sprays behind the line brattice to allay any dust that passes the machine sprays.

Experience at one mine indicates that the absence of shattered ribs and faces provides a natural control over methane emission. This gassy mine now releases methane steadily but in lower volume. Even on exposure of a feeder, the rate of emission is slower than in conventional mining.

Power for Continuous Mining—Messrs. Hunter and Hugus collaborated in presenting the salient facts on power system-design and maintenance, and on conversion units now available for supplying power to continuous mining machines.

Supporting his statements with tables and graphs, Mr. Hunter pointed out that good voltage at the mines is essential to proper operation and satisfactory results; that present information indicates the minimum substation capacity as 150 kw for one machine, 300 kw for two machines and 500 kw for four machines if haulage loads are not included; that maximum distance from substation to miner, at 250 v, should be 2,500 ft with 500 mm and 5,000 ft with 1,000 mm, and at 500 v, maximum distance should be 10,000 ft with 500 mm and 4,500 ft with 4/0 feed line, all with equivalent return; that it is essential to isolate production feeders from haulage loads or other variable loads that will affect production voltage, because isolation is cheaper and usually easier than increasing copper; and that each new installation should be considered as a separate problem until enough experience is gained to permit standardization.

Mr. Hugus agreed that separate power sources for production and haulage loads should be provided and recommended the use of synchronous motor-generator sets for conversion of transmitted power. Advantages of these sets are: simplicity of mechanical and electrical design, automatic restarting in case of ac power interruptions, undervoltage protection to remove the load if the voltage drops off, and ability to absorb disturbances in the ac line. Mercury-arc rectifiers also have many of these advantages, Mr. Hugus stated. A rising-voltage characteristic is desirable in a conversion unit to reduce the danger of stalling the motors of the continuous mining machine, and the synchronous motor-generator set has this feature built in.

In discussing these papers, J. C. Linzenmeyer, Westinghouse Electric Corp., pointed out that overloads within the guaranteed limits of mercury-arc rectifiers have no effect on these units, that down time can be limited to 10 min for tube changes, that the units are light in weight and easily moved, and that they are simple in design.

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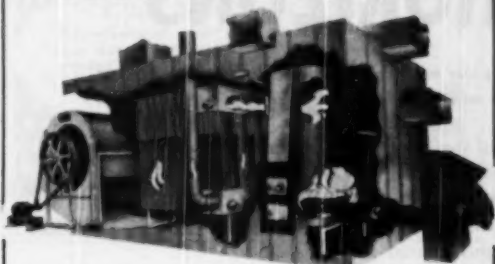
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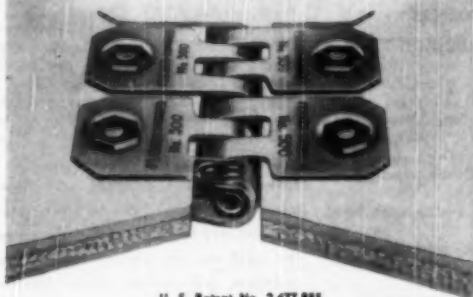
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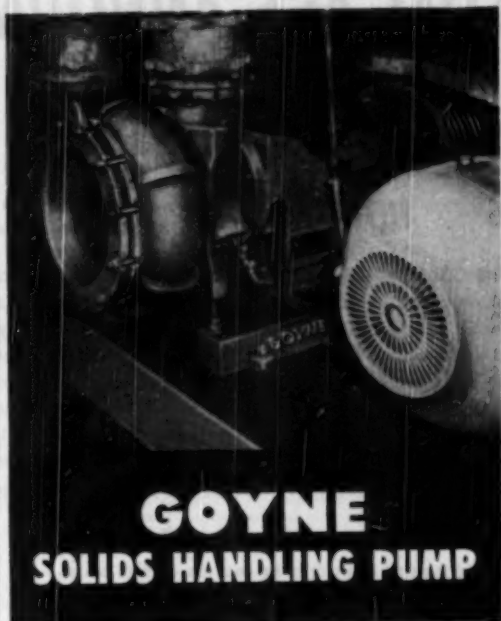


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COAL AGE, in July, will put together under one cover the results of —

A searching re-evaluation of tried and tested methods, materials and equipment in service. An equally intensive exploration of the possibilities of new methods, equipment and materials which bid for additional cost reduction, quality improvement and safety promotion in the future.

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1—Legg-Snell-Rand, with drifter, all on pneumatic tires, used about 6 months

1—Sullivan #1W-6, with drifter, on steel wheels, AC Motor

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1—Nock & Garide Continuous, Push-button Type, Capacity 3000 lbs. Traveling Speed 235 RPM direct connected to 25 HP Motor, complete with counter weights, wire rope, etc.

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4—Connellville Larry Cars, Trolley Operated, 6 Ton Capacity

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1—24" Belt Feeder, 5/8" centers, with 26" face x 24" dia. Dings Magnetic Pulley, R. C. Drive in 2 HP Gear Motor, complete with motor generator set

2—26" face x 24" dia. Dings 250 volt DC Magnetic Pulleys

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2—18"x20" Wood Stave Bins

1—Wood Stave Water Tank 20' dia. x 13' high

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1—20 Ton Fairbanks Truck Scale, Steel Beams, 20' Platform

1—Galigher Auto. Sampler, adjustable stroke—Motorized

2—Bholaiver Coal Washing Launder, complete with Dividing Table, etc.

1—Sight Feed Acetylene Generator

1—50 HP 3-drum Elec. Slusher Hoist

Drag Chain Flight Conveyors from 6" to 30" wide up to 150' long

Motors AC & DC

1—Pipe Threader up to 2", belt drive

1—8"x26" Long Double Deck Coal Shaker

1—5 Ton Fairbanks Tipple Scale

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3—37½ KVA Transformers 440-110/220 volts

Steel Wreckbarrows

45' Sheaves—Electric Gongs

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- 2—Goodman Track Cutting Machines 42 Inch Gauge A.C. 220 Volts.
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- 6—6 Ton G.E. Ball Bearing 42 Inch Gauge
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- 4—5 BU Jops 42 Inch Gauge on Cats. A.C. and D.C.
- 2—1 Lee Nurse Six Ton Kool-Mobiles Model K.M.C. 462

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15 ton Truck Scales..... \$400.00
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14" belt..... \$16.50 20" belt..... \$21.00
16" belt..... 19.00 30" belt..... 22.00
18" belt..... 20.00 36" belt..... 23.00
42" belt..... \$24.00

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36" belt..... 8.00 42" belt..... 10.00
48" belt..... \$11.25

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100—1-2-3 Sanford Day 5-ton Drop Bottom All Steel Mine Cars
Track gauge, 48"; Height overall, 50"; Wheel base, 54"; Length overall, 18'11"; Length of body, 13'6"; Ballbearing wheels 16". Axles 3 1/2". Used very little. A bargain for quick sale.
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Height overall, 50"; Inside length, 10'; Overall length, 13'6"; Capacity, 115 cu. ft.; Inside width, 6"; Track gauge, 48"; Timken Roller Bearing Wheels 16".

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1—3-Track McWally Pittsburgh Steel Tipple complete with McWally Pittsburgh No. 8 Washer, capacity 500 tons per hour.
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These Tipples and Washers are complete installations. Can be used for slope, drift, strip, or shaft mines.

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2—15-ton Goodman, Type M-604C
2—15-ton General Electric, Type HM880
2—15-ton Jeffrey, Type M1110
2—15-ton Westinghouse, Type 900C
1—16-ton Goodman, Type 54-B
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4—4-ton General Electric, Type HM819
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4—4-ton Goodman, Type MA147
4—4-ton General Electric, Type M1110

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100 KW, 200 KW, and 300 KW Late Type Motor Generator Sets and Rotary Converters, equipped with switchboards and all necessary switchgear.

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1—10,000# Nordberg Sgl. Drum AC
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1—16,000# Allis Chalmers Sgl. Drum
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2—Joy 11-BU

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2—Jeffrey 25-U Permissible Type Track Cutters
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2—Goodman 212-AA Low Vein
2—Goodman 112-AA Universal
10—Jeffrey 25-BB Permissible Type
2—Jeffrey 25-L Late Type Longwall
2—Sullivan 18-B Low Vein

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2—Goodman 1803 on Tip Turn Trucks
2—Goodman 11302A
2—Goodman 5182C3 on Tip Turn Trucks
2—Sullivan 7-B on Tip Turn Trucks T-8



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500 KW Whse. DC 275 v., synch. motor, 2200 v.
300 KW Allis-Ch. DC 250 v., synch. motor, 440/2200 v.
200 KW Ridgeway DC 550 v., synch. 2300/4000 v.
150 KW Burke DC 250 v., synch. motor, 440 v.
100 KW Allis-Ch. DC 250 v., motor 2200/440 v.
75 KW Star b.b. DC, 250 v., synch. motor, 440 v.

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1—50 KVA G.E., 2200/440/220 volt.
1—37 1/2 KVA West., same as above.
1—25 KVA G.E., same as above.
1—12 KVA West., same as above.

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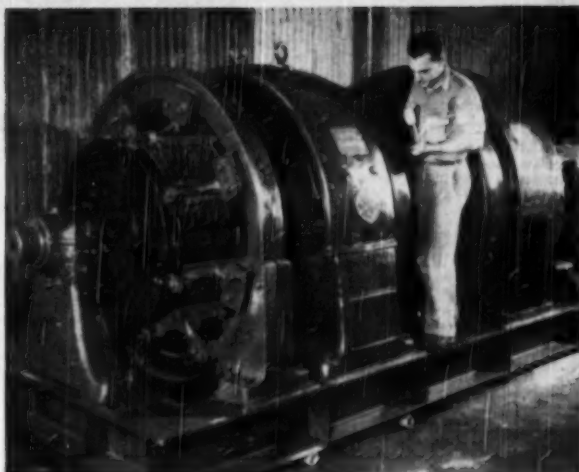
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H.P.	Make	Type	Speed
500	West (2)	CS	1160
400	G.E. (vert)	KP-6335	1180
200	Wagner	RPE	1750
200	G.E.	KP-6335	880
150	West.	CS	580
125	ALCh. (2)	AR	435
100	Wagner (NEW)	XP	1150
100	G.E.	K-544	1175
100	West.	CS	870
100	G.E. (2)	IK	575
75	West.	CS	1750
75	G.E. (3)	K-565	1175
75	G.E.	IK	900
75	G.E. (3)	KT-257	845
75	West.	CS	720
75	G.E.	K-356	690
75	G.E.	KT-558	580
60	P-M	XP	1750
60	Howell	SCR	1800
60	Century	SCR	1150
60	West. (2)	CS-607	880
60	Rel. (2)	AA	875
60	G.E.	KP-546	965
60	G.E.	TEPC (GHE)	427
50	G.E.	PFR-522	3600
50	Elliott	130	3450
50	West	CS	1740
50	L.A. (3)	XP	1150
50	West.	X.P.	1150
50	G.E.	KP-445	1170
50	West.	CS-642C	1160
50	West. (3)	CS	870
50	G.E. (2)	IK	870
50	G.E.	PFR-542	870
40	West.	CS	690
40	G.E.	TEPC (GHE)	561
40	L-A	Adjusto	6/1500

SYNCHRONOUS MOTORS

H.P.	Make	Type	Speed
600	Al-Ch		1200
475	West.		720
400	G.E. (2)	TS-928H	600
300	G.E.	ATI	990
260	G.E.	TS	990
250	Ideal	SMN	300
200	G.E. (2)	25 cy	500
200	Ideal	NMW	267
180	G.E.	ATI	900
135	West.		1200
135	Ideal		1200
100	Elec. Prods. G		1200
100	Rel. Mach.		1200

SLIPRING MOTORS

H.P.	Make	Type	Speed
750	G.E.	MT	1000
600	CR. Wh.	131AQ	507
500	G.E. (2)	IM	450
400	West.	CW1218	600
350	Wagner	25 cy.	710
200	G.E.	MTP-587	1000
200	G.E. (2)	IM	1170
150	Wagner	21VRN	900
100	Al Ch.	IM	690
75	West.	CW	1150
75	G.E.	IM	690
60	West.	HP	580
60	Al Ch.		690
50	G.E.	MT-536	1180
50	West.	CW	1150
50	L.A.	CGH	870
50	P-M	BV	690
50	Al Ch.	ARY	870
50	G.E.	IM	490

115 V.D.C. MOTORS

H.P.	Make	Type	Speed
200	West	SK	900
100	Cr. Wh.	CMC	1000
40	G.E.	CD-113	950

230 V.D.C. MOTOR

H.P.	Make	Type	Speed
400	A-C		415
150	G.E.	MPC	490
135	C-W	CCM152H	231/900
125	G.E.	RC-15	1750
100	G.E.	RC-14	1750
100	Al Ch.		1160
90/45	G.E.	RF-17	960/475
75	Sprague		1000/1500
75	West (2)	SK-180	475
75	Cr. Wh.	L.T.	450/670
75	Cr. Wh.	CMC	275/950
75	B-D	258	450/1350
75	West (2)	SK151	250/1000
60	West (2)	SK-160	480
50	G.E.	RC-12	1750
50	Dinhl		850/1650
45/90	G.E. (2)	RF-17	475/1550
50	West (2)	SK-160	565
50	G.E.	RF-17	250/1000
50	West.	SK	250/1000
40	West.	SK-102	1750
40	Century	DN-454	1740
40	G.E.	RC-31	1700
40	G.E.	RC-32	1100
40	G.E.	RC-24	1700
40	G.E. (2)	CD-1461	400/1500
40	Cr. Wh.	CCM	700
40	Rel.	461T	400/1200
35	West.	SK	250/1000
35	West.	SK-120	1150
35	G.E.	RLC	440/900
30	G.E. (8)	CDM-68	2700
30	West.	SK	975
30	Cont.	D-102	850
30	G.E.	RC-33	775
30	West.	SA	500/1300
20	West (2)	SK-143	575
20	G.E.	RC-15	1750

250 V.D.C. MOTOR GENERATOR SETS

KW	Make	Speed
900	G.E.	1200
900	West.	1100

KW	Make	Speed
100	Elliott	1200
800	G.E.	1200
1000	Al Ch.	1200
200	G.E. (2)	750
200	G.E.	1200
160	West.	900
100	Delco	1200
75	G.E.	1200
50	G.E.	1200
40	Rel.	1740
42	ABC (2)	1200
30	G.E.	1200
25	G.E.	1200

125 V.D.C. MOTOR GENERATOR SETS

KW	Make	Speed
250	G.E.	750
150	Cr. Wh.	1200
150	West. (2)	1150
100	West. (1)	1200
75	G.E.	1200
100	El Machy.	1200
75	Hartner	1150
80	Sturt.	2800
60	West. (2)	1140
50	G.E.	1750
85	Ideal	1200
50	G.E.	1160
25	L.A.	1450
25	El Machy. (2)	1150

CENTRIFUGAL PUMPS

GPM	H. Head	Make
50	65	Dean-Hill
75	75	Dean-Hill
100	100	Dean-Hill
100	100	Ingersoll-RD
150	100	Dean-Hill
450	46	Ingersoll-RD
600	70	Ingersoll-RD
120	120	Barret
2500	725	Peelers

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AC MOTORS TO 900 HP SLIP RING & S.C.—
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100 KW West. SK. 275 V. 600 RPM
100 KW Delco 275 V. 1200 RPM

D.C. MOTORS

200 HP West. SK. 230 V. 400/600 RPM
200 HP G.E. RC. 900 V. 900 RPM
150 HP West. SK. 230 V. 400/600 RPM
125 HP West. SK. 230 V. 450/1000 RPM
75 HP West. S. 230 V. 875 RPM
50 HP West. SK. 230 V. 1700 RPM
30 HP West. SK. 230 V. 1700 RPM
20 HP West. SK. 500 V. 1700 RPM
15 HP West. SK. 500 V. 1700 RPM

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WALnut 1-4300



DOUBLE CANTILEVER COLBY CRANE

300' span, 12 1/2' ton lift, 43' track span, 44' lifting height. Double control cabs. 440 volt, 3-phase, 60 cycle. In very good condition. Located at Richmond, California.

An exceptional buy. Write for complete specifications.

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OTTUMWA HOIST: cylinder-conical, 1" rope grooves, hoisting range to 400', 150 HP AC 2300 volt motor, complete with all magnetic controls ready for operation, excellent condition.

PUMP: Fairbanks Morse, figure 5592, 2-stage, "Built-together," with 30 HP motor and AP automatic primer, 175 gal./min. at 400 ft. total head, new condition, \$350.
RR TRACK SCALE: 100 ton, 50 ft., weighs perfectly, \$500.00 where-is, now set up for operation.

LONGWALL CONVEYORS: 2—each 300 ft., complete and in excellent condition.
LONGWALL MACHINES: AC—Goodman and Sullivan CLE and CH8, will sacrifice.

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Complete coal tippie including power house. McNally-Pittsburg 3-track, 4-preparation, 4-car-per-hour installation, consisting of breaker, shal conveyor, double hanging shaker screens, 4 Mannier loaders, all with electrical equipment. Ottumwa box car loader shaker screen with engine, 2 car pullers, 100 HP boiler. Priced salvage value.

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FOR SALE

1—29 LC Jeffrey Arcwall Mining Machine, 250 DC. Volt, used about 60 days in entry.

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P. O. Box 216 Knoxville, Tennessee

FOR SALE

(1) 600 HP. General Electric I-M, 2300/60/3/450 rpm. Complete with full reversing magnetic control for hoist duty, resistance, etc.

Several others available from 50 to 400 HP

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E. P. DIETRICH

829 Richmond Street
Scranton 9, Pa.

2—Goodman Style G20B77 permissible Shaker Conveyors, latest type, with manual type HAD duckbill and 20 HP Westinghouse AC motor, 3 phase, 60 cycle, 220 volt, 1160 RPM.

without line troughs.....\$2,600.00 each
with 300' new line troughs.....4,350.00 each

The above equipment is to include all usual accessories and is guaranteed to be in A-1 condition. New in 1943. It is offered subject to prior sale, f.o.b. Sunnyside, Utah.

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Sunnyside Mine
Sunnyside, Utah

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7 1/2 h.p. G.E. 250 v. 450/1200 r.p.m.
7 1/2 h.p. G.E. 1 v. 450/1200 r.p.m.
7 1/2 h.p. G.E. 208 v. 1150 r.p.m.
5 h.p. C.W. Vertical, 230 v. 600 r.p.m.
5 h.p. G.E. v. 150/1000 r.p.m.
5 h.p. West. 230 v. 855 r.p.m.
1 h.p. G.E. 230 v. 525/2100 r.p.m.
1 h.p. G.E. 230 v. 1150 r.p.m.

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NEW—USED A. C. MOTORS—ALL SIZES.

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Baker 5887

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12"	4	1/16"	1/32"	28 Oz.
14"	4	1/16"	1/32"	28 Oz.
16"	4	1/8"	1/32"	28 Oz.
18"	4	1/8"	1/32"	28 Oz.
20"	4	1/8"	1/32"	28 Oz.
22"	5	1/8"	1/32"	28 Oz.
24"	4	1/8"	1/32"	28 Oz.
26"	5	1/8"	1/32"	28 Oz.
28"	5	1/8"	1/32"	28 Oz.
30"	4	1/8"	1/16"	32 Oz.
32"	5	1/8"	1/16"	32 Oz.
34"	6	1/8"	1/16"	32 Oz.
36"	6	1/8"	1/16"	32 Oz.
42"	5	1/8"	1/16"	32 Oz.
48"	8	1/8"	1/16"	32 Oz.

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- 3—40 ton, diesel operated, new 1942.
- 2—25 ton American, steam, new 1942.
- 1—25 ton, Ohio, steam, new 1942.

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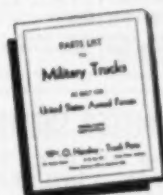
KW	Make	Speed	DCV
500	G. E.	1200	600
800	G. E.	1200	600
1000	G. E.	1200	275
175	G. E.	1200	275
75	G. E. (5 Ph.)	1800	275

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- Studebaker or Reo 2½ ton 6x4 or 6x6
- International M-5H-6 2½ ton 6x6
- Other Trucks

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1-800 KW G.E. Syn. 275 V. 1200 RPM
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2-300 KW G.E. Syn. 275 V. 1200 RPM
1-200 KW G.E. Syn. 575 V. 1200 RPM
1-200 KW G.E. Syn. 275 V. 1200 RPM
1-200 KW G.E. Syn. 575 V. 1200 RPM
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1-200 KW G.E. Syn. 575 V. HCC 1200 RPM
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2-35 KW G.E. 575 D.C. 1200 RPM Generators
1-600 KW G.E. 275 V. MFC 900 RPM Armature
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2-30 T JEFFREY 250 V. MH-77 48-34" Ga.
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3-13 T JEFFREY 250 V. MH-2110 42-32" Ga.
1-13 T G.E. 250 V. MH-827 44-34" Ga.
1-10 T JEFFREY 250 V. MH-110 44-32" Ga.
1-4 T WEST. 250 V. ML-900 44-34" Ga.

LOCOMOTIVE MOTORS

2-JEFFREY 250 V. MH-77, Ball Bearing
2-G.E. 500 V. MH-820-A, Ball Bearing
2-WEST. 250 V. ML-900-C, Ball Bearing
2-WEST. 250 V. ML-907-C, B.B. (New)
2-WEST. 250 V. ML-904-C, Ball Bearing
2-WEST. 250 V. ML-904-R, B.B. (New)
1-WEST. 250 V. ML-901-C, Ball Bearing
2-G.E. 85/125 V. MH-820-A, Ball Bearing

LOCOMOTIVE ARMATURES

MH-77-250 V. MH-75-500 V. 900-C-500 V.
900-C-250 V. 903-B-250 V. 901-C-250 V.
150-C-250 V. MH-820-A-500 V.
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75 ft. long by 18 ft. wide by 30 ft. high.
5 compartments, 175 tons each, 8 openings on sides of bins. 7 with shaker screens, one with bar screen. Both end bins have 2 doors underneath.

INCLUDING

2 Rescreen Bucket Elevators, 68 ft. and 64 ft. high.
2 Degradation Conveyors under bin 98 ft. long.
Distributing Conveyor on top of bin 36 inches wide, 143 ft. center to center.

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LOCOMOTIVES:

Jeffrey, Westinghouse, General Electric, Goodman, Buddon.

SUBSTATIONS:

Motor Generator Sets, Rotary Converters.

SPARE ARMATURES:

For Locomotives, Machines, Rotary Converters and others.

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D.C. and A.C., 3 Phase.
1-Buckeye 150 H.P., 600 RPM Western Electric type AT-13-150 220/440 volt can be rewound for 2200 volt-direct connected motor.

TRANSFORMERS:

3 phase and single phase, also rotary.

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LOADING MACHINES - PUMPS - COM-
PRESSORS - GENERATORS - WELDERS
- AERIAL TRAM - LARRY, SLATE -
BOOM LOADING - BIT SHARPENERS,
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Joy 14 BU loader.

G.E. 10 ton locomotive-42" G.

Jeffrey MH-100 locomotive-8 ton.

Jeffrey MH-88 cable reel locomotive.

G.E. 150 KW converters, complete with switchboards and transformers.

G.E. 100 KW converter, complete with switchboards and transformers.

Goodman shortwall.

Robins vibrators.

Jeffrey 6A drills.

Bank cars, Joy parts, loading booms, belt conveyors, feeders and other items too numerous to mention.

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Athens 822 or 24002

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at Baltimore, Maryland

Partially installed in 1943. Never used. Consists of coal conveyors, coal elevator and attendant equipment of 25 tons capacity bituminous per hr. Also, Riley No. 5 duplex Atrita pulverizer with attendant equipment of 20,600 lbs. capacity per hr. Also, conveyors and attendant equipment for ash and fly ash removal of 14 tons dry ash capacity per hr. Bids desired on as is, where is basis. Address inquiries to Mr. C. E. Paules, attention: Mr. A. B. Strickler, Standard Oil Development Company, Esso Engineering Department, P. O. Box 121, Linden, New Jersey. Telephone: Elizabeth 2-3900.

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Belt, Bucket, Drag or Gravity
Shaker & Vibrating Screens
Truck Scales - Coal Crushers
Coal Drills - Car Spotters -
Mine Fans - Electric Motors
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MODEL K-360 WITH CAT-
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SIDE FRAMES 24" TRACKS
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Sterling Equipment Company

438 Builders Exchange Bldg.

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FOR SALE-21507 Sullivan 220-volt open type
Lafayette Back Loader, equipped with an A-301
Handler driven by 15 Hp Ball Bearing drip proof motor
with choke coil starter and safety switch, built with
controls on left and for Mine Car, 30" high, 8" wide,
10' inside length, track gauge to suit.

TURKEY GAP COAL & COKE CO.

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Timber setters, shuttle cars, T-Trucks, 15" chain conveyors, MTB, 30" conveyor, 1000 ft. Latest model, used less than 3 months

GOODMAN EQUIPMENT

No. 460 loader, 6 ton locomotive, good operating condition.

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Joy 20" Chain Conveyors complete. Ladel 14" Chain Conveyors complete. Including motors, speed reducers, starters, extra drives and pans. Three and a half months to five years old. Priced to sell. List upon request.

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2,045 feet of 36"-4 ply 48 in. duck heavy duty natural rubber conveyor belt, ¼" top cover, 1/32" bottom cover and breaker strip in addition to 36" top cover. Used less than sixty days. Can be inspected at Memphis, West Virginia. Price 75% of current new belt cost. Offered subject to prior sale.

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Sharpton, W. Va.

BARGAINS FOR SALE OR RENT 100 KW. Diesel Engine Generator Sets

11—100 kw. 350/275 V. D.C. Diesel Generator dtr. con. to 100 HP. GHD-5, 514/27, 5 cyl. Superior DIESEL Engine. Also, standard, power packs and accessories.
9—100 kw. same as above with 350/400 V. 150 & C. Generators.
1—60 kw. West. 250 V. D.C. dtr. con. to NEW P.A.E. Diesel Engine.
9—50 kw. 250 V. D.C. NEW GAS or CAROLINE Engine Generator Sets.
6—27½ kw. 250/440 V. 3 ph., 60 cy. NEW Gas or Quadline, also Diesel Engine Generator Sets.

A.C. Generators

6—NEW 100 kw. Westinghouse 350/440 v., 3 ph., 60 cy., 1300 rpm.

330 V. D.C. Motors

HP	MAKE	TYPE	SPEED	
300	West.	MD	500	
175	G. E.	MD	400	
150	West.	SK	500	
135	G. E.	CD	400	
120	Century	dry proof	1200	
100	West.	SK-190	400	
75	West.	S	475	
75	G. E.	CEM	1200	
60	G. E.	INC—split proof	550	
60	NEW	West.	SK-130	550

D.C. Generators—250-375 V.

KW	MAKE	TYPE	SPEED
350	West.		1200
300	West.	SK-210	600
150	West.	SK	600
110	West.	SK-190	700
100	West.	SK	720
100	West.	S	600
100	G. E.		720
75	Atlas Chalmers		720
75	West.	S	650
75	Atlas Chalmers		670
60 NEW	G. E.	CD	1100
60 NEW	West.	SK-130	1100

MO SETS—250/375 V. D.C.

KW	MAKE	RPM	VOLTS	TYPE
220	West.	1200	200/4000	AC Rtn.
200	West.	1200	200/400	AC Rtn.
200	West.	1200	250/400	AC Rtn.
150	Burke	900	300/400	AC Rtn.
150	West.	900	300/400	AC Rtn.
100	Daim	1200	250/400	AC Rtn.

Transformers—1 ph., 60 cy.

No.	KVA	Make	PRIMARY	Sec.
3	500	G. E.	2200	250/400
3	500	Maloney	2200	250/400
3	500	G. E.	5000/4180V	250/400
3	100	West.	3600/4180V	250/400
3	100	Pgh.	2200	250/400
1	100	Portland	2200	250/400
3	75	West.	2200	250/440
1	75	West.	12500/4000	2000
3	37½	Packard	2200	110/220
3	25	Maloney	2200	110/200

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31,000 Lined Feet #2/0 Medium Hard Drawn Standard Bare Copper Wire.
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Hotel Norton Phone 608 & 300

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Phone 2730 - 1253

EQUIPMENT

SHOVELS

Model	Serial No.	Price
Lorain	75 B	6891
"	72 A	2450

ROLLERS

Buffalo Springfield	18028	4000
"	18341	4000

AIR COMPRESSORS

Schramm	160	150625	1000
"	165	154540	1000
"	120	12578	750

BULLDOZERS

Allis-Chalmers	HD14	3592	6000
"	HD14	2874	6000
"	HD14	5803	6000
"	HD14	5304	6000
"	HD14	2412	6000
"	HD14	2686	6000
"	HD14	4261	6000
"	K	9011	2000

SCOOPS

Garwood	515 Cable HD14	1135	5000
"	515 "	HD14	1385
"	515 "	HD14	1502
"	515 "	HD14	4251

(All Tractors & Dumps Factory sub.).

CABLE CONTROL UNITS

Garwood	14725	1500
"	11816	1500

GRADERS

Allis-Chalmers	AD	L2326	4500
"	AD	L2356	6000

(Factory cab, heater, defroster, windshield wiper)

MOTORS

GMC	671 Complete ready to set in—Rebuilt	1000
Westing	For 75 Lorain—Rebuilt	750

ROOTERS

Garwood	Cable C-30	500
"	Hydraulic H-30	500

TRAILERS

Lectro	11 Ton	724	1200
Freuhof	30 Ton	T-62053	2500
Superior—Van with Parts Bin—Air Brakes			1000
Superior—Van with Parts Bin—Air Brakes			1000

PUMPS

Ingersoll-Rand	2½"	14074	100
Marlow	1½"	17058	75
"	1½"	17548	75
"	2"	20570	100
Carver	1½"	1197	75
Jaeger	3"	P7920	150
Barnes	4"	21251	450
Barnes	4"	852283	450

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Masters	NEW	QL-150	400
"	NEW	TA-905	450
Red Devil	NEW	300	150

WELDERS

Lindco	300	167264	500
P & H	300	236671	450

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	Model	Serial No.	Price
International	KR11	X 1941	2000
"	KR11	Z 1944	3000
"	WA22	X 1942	2000
"	WA28	Y 1942	1750
General T	614	Y 1942	1500
"	614	Y 1941	750
"	614	Y 1940	1500
"	614	Y 1940	1550
"	614	Y 1945	1300
Flat Bottoms	V-8	U 1945	500
"	V-8	U 1945	500
"	V-8	U 1943	500

Flat Bottoms	Y	1945	1946
Y-8	U	1945	500
Y-8	U	1945	500
Y-8	U	1944	150

MISC. EQUIPMENT

Steam Jany Homestead	12407	250
Garage Compressor Brunner Ebe	5700	250
Paving Breaker Thor	25	1201
Jackhammer Thor	75	70991
"	75	74442
Temper	Air	23725
"	"	52131
Air Wrench Chicago Pneumatic ½" Drive		300
Air Wrench Chicago Pneumatic 1" Drive		350
Air Wrench Chicago Pneumatic 1½" Drive		350
McCulloch Chain Saw		1411
Sioux Valve Grinder		600
Shaw-Walker Hot Air Heater		10005
Shaw-Walker Hot Air Heater		15048
Mall Concrete Vibrator		150

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200 Ft. 1" or 30c.	
150 Ft. 2" or 50c.	
250 Ft. 3" or 75c.	
100 Ft. 4" or \$1.00.	

All equipment has been rebuilt and repainted—with the idea of preceding to another job and not with the idea of selling.

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GMC 671 Motor
Generator—Electric Machine Co. NEW

PLANT EQUIPMENT

28 Ton Steel Win
24"x42" Reapgrinding Feeder SHP Motor
Variable Speed
14x34 Shaker Screen Picking table, 7½ HP Motor
24x40 Single Roll Crusher, 75 HP Motor
Ball-Land
30x40 Auxiliary Flight Conveyor, 15 HP Motor
30x14 Auxiliary Flight Conveyor, 7½ HP Motor
2—10x24 Flight Conveyors (Boney) 4 HP Motors
GENERATOR HOUSE — Aluminum Shouting
Paved Construction, built for easy dismantling
and erecting.
All drives are either belt or chain.
All motors have fuses box and push button switch.
Plant is mounted on I beam frame for easy moving
is one unit.

This outfit is absolutely like new.
Cost \$25,000; will sell for \$15,000.

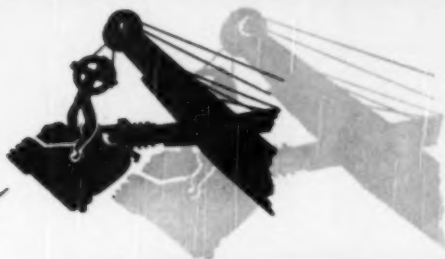
60 Tons of 85 lb. rails with ties,
splice bars, bolts—market price.

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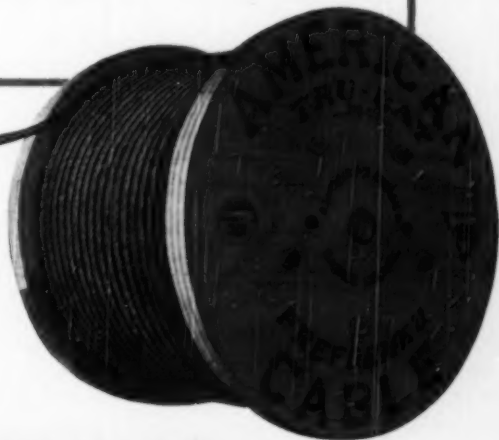
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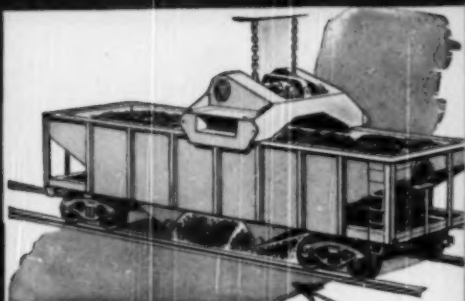
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